



Purchasing Division  
 2019 Washington Street East  
 Post Office Box 50130  
 Charleston, WV 25305-0130

State of West Virginia  
 Request for Information  
 21 - Info Technology

Proc Folder: 120401

Doc Description: Request for Information (CRFI) to replace MPLS contract

Proc Type: Request for Information

Date issued	Solicitation Closes	Solicitation No	Version
2015-06-25	2015-07-30 13:30:00	CRFI 0210 ISC1500000002	2

**BID RECEIVING LOCATION**

BID CLERK  
 DEPARTMENT OF ADMINISTRATION  
 PURCHASING DIVISION  
 2019 WASHINGTON ST E  
 CHARLESTON WV 25305  
 US

**VENDOR**

Vendor Name, Address and Telephone Number:  
 Comcast Business Communications, LLC  
 1701 JFK Boulevard  
 Philadelphia, PA 19103  
 412-747-6489

No statement made in the proposal shall be considered a contractual term unless expressly included in a contract mutually negotiated between the parties as part of the post bid submission process. At that time, Comcast would be amenable to negotiating modifications to the Contract appended to the RFP, to the extent allowed by law or as mutually negotiated by the parties, and to address additional items (if any) that your organization feels are critical to its consideration and use of the Comcast solution. Comcast also reserves the right to include any additional terms and conditions upon which the above mentioned services are being specifically offered by Comcast as a highly regulated provider of such services.

**FOR INFORMATION CONTACT THE BUYER**

Guy Nisbet  
 (304) 558-2596  
 guy.l.nisbet@wv.gov

07/29/15 14:54:21  
 WV Purchasing Division

Signature X

FEIN# 23-1709202

DATE July 28, 2015

All offers subject to all terms and conditions contained in this solicitation

INVOICE TO		SHIP TO	
DEPARTMENT OF ADMINISTRATION OFFICE OF TECHNOLOGY 1900 KANAWHA BLVD E, BLDG 5 10TH FLOOR CHARLESTON WV25305 US		WV OFFICE OF TECHNOLOGY BLDG 5, 10TH FLOOR 1900 KANAWHA BLVD E CHARLESTON WV 25304 US	

Line	Comm Ln Desc	Qty	Unit Issue
1	See Attached Request for Information Files	0.00000	

Comm Code	Manufacturer	Specification	Model #
81161700			

**Extended Description :**  
Requesting information for the replacement of the current MPLS contract (MPLS07)

ISC150000002	<b>Document Phase</b> Draft	<b>Document Description</b> Request for Information (RFI) to replace MPLS contract	<b>Page 3</b> .
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**ADDITIONAL TERMS AND CONDITIONS**

See attached document(s) for additional Terms and Conditions

**SOLICITATION NUMBER:** CRFI 0210 ISC1500000002

**Addendum Number:** No.01

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The purpose of this addendum is to modify the solicitation identified as ("Solicitation") to reflect the change(s) identified and described below.

**Applicable Addendum Category:**

- Modify bid opening date and time
- Modify specifications of product or service being sought
- Attachment of vendor questions and responses
- Attachment of pre-bid sign-in sheet
- Correction of error
- Other

**Description of Modification to Solicitation:**

Addendum issued to publish and distribute the attached information to the vendor community.

**Additional Documentation:** Documentation related to this Addendum (if any) has been included herewith as Attachment A and is specifically incorporated herein by reference.

**Terms and Conditions:**

1. All provisions of the Solicitation and other addenda not modified herein shall remain in full force and effect.
2. Vendor should acknowledge receipt of all addenda issued for this Solicitation by completing an Addendum Acknowledgment, a copy of which is included herewith. Failure to acknowledge addenda may result in bid disqualification. The addendum acknowledgement should be submitted with the bid to expedite document processing.

# ATTACHMENT A

Questions and WVOT Responses for WV State Office of Technology RFI

1) Pg 7 - Under current environment, paragraph #2. – Do the connections between the existing State PoP's have to be postalized rates?

**A.1 WVOT Response:** Our preference is for these circuits to have postalized rates. They will be solicited separately. Please provide any notable pros and cons for this approach.

2) Pg 7 – Under Purpose – Please define the difference between Statewide transport and county-wide. Can you also define “related services statewide”.

**A.2 WVOT Response:** Statewide refers to the provisioning of circuits to State sites in all 55 WV counties; County-wide refers to the provision of circuits to State sites within a county or counties. Related Services refers to any additional services necessary for the provision of voice or other delay-sensitive traffic; examples would include NPA-NXX-xxxx numbers, Quality of Service parameters, and transport.

a. Please provide more details about “Point-to-Point Private Line Services.”

**A.2.a WVOT Response:** Point-to-Point Private Line Services refers to dedicated connections between two State sites – these could be DS1 (1.5Mb/s), DS3 (45Mb/s), 10/100/1000MB/s switched ethernet etc.

b. Please provide more details about “Ethernet Dedicated and Multi-point Switched Services.”

**A.2.b WVOT Response:** Ethernet Dedicated refers to point-to-point Ethernet services, Multipoint Switched Services refers to multiple State sites being connected to a main State site, usually across a higher bandwidth Ethernet circuit across a service-inherent network.

c. Please provide more details about “Multi-protocol Label Switching (MPLS) Services.”

**A.2.c WVOT Response:** MPLS refers to the provision of circuits between State sites across an MPLS-based, quality of service-inherent network.

3) Pg 8 – Please help us understand by clarifying and/or providing examples of what you are looking for in #2 through #4.

**A.3 WVOT Response:** In general, we are seeking information for specifications and evaluation parameters when soliciting telecommunications services with respect to a vendor's Network Design, Service/Support Infrastructure, Security Practices and any notable concerns in provisioning circuits on a County-wide level; although the actual response requirements begin at the bottom of page 8 through Page 9.

4) Page 9 - #2.2 through 2.2.4 – Related to question #2 above. Could you better define/clarify what you mean by Statewide transport or what type of response you are looking for.

**A.4 WVOT Response:** See responses to #2 and #3 above.

- 5) Please describe what services the State of WV specifically purchases from Verizon today and how they are used by the State and the agencies.

**A.5 WVOT Response:** The current MPLS07 contract is with both Verizon and Frontier. The services purchased from this contract include MPLS Services, Private IP services, private line point-to-point services, Frame Relay Services, ATM Services, Ethernet Services, IP Trunking Services.

- 6) What assessment criteria will be used to assess each bidder and is the criteria and scoring of the assessment documented?

**A.6. WVOT Response:** This RFI is seeking assessment criteria to be considered for the replacement contracts for the current MPLS07 contract; that criteria is yet to be finalized.

- 7) Does the State consider Ethernet Transport and Ethernet Access the same?

**A.7. WVOT Response:** For the purpose of this RFI, Yes.

- 8) How much of the state will a vendor need to cover with Ethernet access in order to be considered a viable contender?

**A.8 WVOT Response:** For the County Contracts, the State of WV preliminarily plans to consider all vendor responses at a County-wide level. A vendor does not have to provide services in multiple Counties to be viable in a single County.

**ADDENDUM ACKNOWLEDGEMENT FORM**  
**SOLICITATION NO.:**

**Instructions:** Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.


**Acknowledgment:** I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

**Addendum Numbers Received:**

(Check the box next to each addendum received)

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> Addendum No. 1 | <input type="checkbox"/> Addendum No. 6  |
| <input type="checkbox"/> Addendum No. 2            | <input type="checkbox"/> Addendum No. 7  |
| <input type="checkbox"/> Addendum No. 3            | <input type="checkbox"/> Addendum No. 8  |
| <input type="checkbox"/> Addendum No. 4            | <input type="checkbox"/> Addendum No. 9  |
| <input type="checkbox"/> Addendum No. 5            | <input type="checkbox"/> Addendum No. 10 |

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Comcast Business Communications, LLC  
 \_\_\_\_\_  
 Company  
  
 \_\_\_\_\_  
 Authorized Signature  
 July 28, 2015  
 \_\_\_\_\_  
 Date

**NOTE:** This addendum acknowledgement should be submitted with the bid to expedite document processing.  
Revised 6/8/2012



# COMCAST BUSINESS

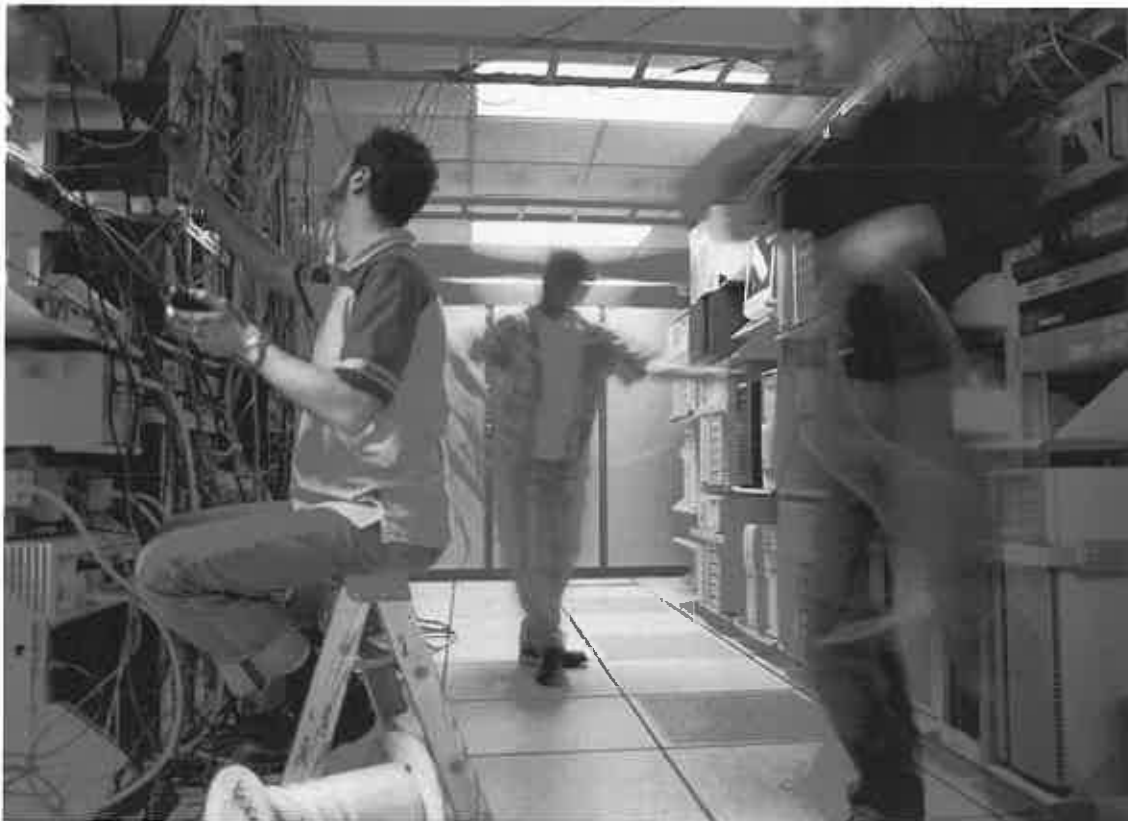
**Comcast Business Communications, LLC** *a Delaware limited liability company, on behalf of itself and its applicable operating affiliates and subsidiaries offering services throughout this Network Service Proposal identified as "Comcast".*

## NETWORK SERVICE PROPOSAL

State of West Virginia  
Request for Proposal

CRFI 0210 ISC1500000002  
July 30th, 2015

Jeffrey Kay  
Strategic Enterprise Account Executive  
15 Summit Park Drive  
Pittsburgh, PA 15275  
412-667-8583  
jeffrey\_kay@cable.comcast.com



# COMCAST BUSINESS

## Transmittal Letter

July 30th, 2015

Ms. Gale Given  
State of West Virginia  
1900 Kanawha Blvd East WV Office of Technology Building 5, 10th Floor  
Charleston, WV 25305

Dear Ms. Given,

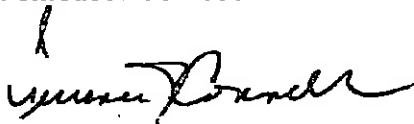
Comcast looks forward to a mutually rewarding business relationship with State of West Virginia and its representatives. Comcast Business Communications, LLC ("Comcast") is pleased to provide this proposal (the "proposal") to State of West Virginia ("State of West Virginia") for managed network services in response to the request for proposal; CRFI 0210 ISC1500000002 dated June 25th, 2015 for State of West Virginia.

State of West Virginia is responsible for compliance with applicable state and local procurement laws. It is our understanding that State of West Virginia, based on this request for proposal, is not seeking services pursuant to the State Procurement code or under a current cooperative purchasing agreement between Comcast and the State under which State of West Virginia is a qualified buyer.

As you proceed in the selection process, please feel free to contact your Strategic Enterprise Account Executive, Jeffrey Kay, at 412-667-8583, with any questions, comments, or concerns. Comcast is committed to providing services for both 'On-Net and Off-Net', see attached PSA for more additional details.

No statement made in the proposal shall be considered a contractual term unless expressly included in a contract mutually negotiated between the parties as part of the post bid submission process. At that time, Comcast would be amenable to negotiating modifications to the Contract appended to the RFP, to the extent allowed by law or as mutually negotiated by the parties, and to address additional items (if any) that your organization feels are critical to its consideration and use of the Comcast solution. Comcast also reserves the right to include any additional terms and conditions upon which the above mentioned services are being specifically offered by Comcast as a highly regulated provider of such services.

Sincerely,  
Comcast Business Communications, LLC



Terrence J. Connell  
Senior Vice President

# COMCAST BUSINESS

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# COMCAST BUSINESS

## Executive Summary

In the ever-changing world of communications, Comcast redefines how high bandwidth products and services are delivered. Comcast brings unsurpassed scalability, reliability, resiliency, and leading edge solutions directly to your organization. Comcast can meet your organization's communications needs quickly, efficiently, and professionally with business-class service and support. Comcast is well positioned to offer long-term value to support future technology strategies. Our integrated Internet and data products are delivered over an extensive and deep enhanced fiber optic network that is physically diverse from the phone companies.

Comcast proposes, specifically, to provide a managed and scalable Wide Area Network and scalable Internet Access that will seamlessly link each individual site listed in the RFP. Your organization will be able to exchange data at various speeds from each site.

Comcast feels this proposal offers a flexible solution that is capable of meeting current and future demands. Other Comcast advantages include:

### Performance

- Major performance improvements and cost reductions over legacy WAN technologies like T1, Frame Relay, ATM, and private lines

### Resilient, robust enhanced fiber network for ongoing operations and business continuity.

- High network availability, minimal latency and low packet loss
- Self-healing, redundant core network architecture
- A network covering 141,000 fiber route miles

### Highly reliable and scalable Ethernet data and Internet services tailored to meet your needs.

- Manageable services that grow with your business
- Bandwidth in flexible increments from 1Mbps to 10Gbps

### Our Comcast Business Promise

- Dedicated Project Managers
- Proactive Monitoring to the Customer Premise
- Service Level Agreement
- 24x7 Dedicated Enterprise Support

Comcast is pleased to submit this proposal for state-of-the-art, efficient and affordable high-bandwidth digital communications services. Comcast looks forward to developing a solid business relationship with you and to assisting your organization in addressing its communication needs. Comcast is confident that the solutions presented in this proposal will provide a cost-effective solution that supports business objectives and quality requirements and will enhance your overall communication services portfolio.

# COMCAST BUSINESS

## Solution Overview

Comcast is uniquely positioned to offer long-term value to support current and future technology requirements. Based on the requirements specified Comcast would specifically propose provisioning the following as a solution.

### Comcast Ethernet Network Service

Comcast Ethernet Network Service is a reliable, cost effective alternative to traditional hub and spoke network topologies using Frame Relay, TDM private lines or ATM, offering a more flexible and scalable network solution. Perfect for organizations with many locations and high data traffic, Comcast Ethernet Network Service enables customers to connect physically distributed locations across a Metropolitan Area Network (MAN) as if they are on the same Local Area Network (LAN).

### Comcast Ethernet Dedicated Internet Service

Comcast Ethernet Dedicated Internet Service is a simple, reliable and more flexible option to traditional private line dedicated Internet access services, providing higher bandwidth and increased efficiencies. Ethernet Dedicated Internet provides an Ethernet Virtual Connection (EVC) from the customer premises location to a Comcast Internet Point of Presence (POP) router. Our Ethernet interface enables compatibility with your LAN.

### Comcast Ethernet Private Line Service

Comcast Ethernet Private Line Service is a reliable, flexible, high bandwidth alternative to traditional TDM Private Lines, enabling customers to connect their Customer Premises Equipment (CPE) using a lower cost Ethernet interface. Your organization can meet the demand of bandwidth-intensive applications without disrupting your internal customers' needs with flexible, scalable point-to-point configurations delivering high-capacity fiber connections between two sites.

## Comcast Business ETHERNET

### RELIABLE, RESILIENT DESIGN

High network availability, minimal latency and low packet loss

### FULLY SCALABLE SOLUTIONS

Symmetrical dedicated bandwidth configurable from 1Mbps to 10Gbps

### BROAD & DIVERSE NETWORK

Your information travels across our own enhanced fiber network with 141,000+ national route miles of fiber

### REDUNDANT CORE ARCHITECTURE

Rapid recovery time from network incidences

### OUR COMCAST BUSINESS PROMISE

Dedicated project managers, proactive monitoring to the customer premise, service level Agreement, and 24x7 Dedicated Enterprise Support

### TOP APPLICATIONS

- Remote LAN connectivity
- High-Speed Internet access
- Server consolidation
- Data storage, backup and recovery
- Transport for VoIP



Metro Ethernet Forum  
[metroethernetforum.org](http://metroethernetforum.org)

# COMCAST BUSINESS

## Comcast Ethernet Virtual Private Line Service

Comcast Ethernet Virtual Private Line Service is a reliable, flexible, cost effective alternative to traditional TDM Private Lines, Frame Relay or ATM, delivering the high bandwidth you need. Similar to Ethernet Private Line, Ethernet Virtual Private Line provides an Ethernet Virtual Connection (EVC) between two customer locations, replacing frame relay or ATM services while also supporting Service Multiplexed User Network Interfaces (UNI), allowing for a single physical connection to customer premise equipment for multiple virtual connections.

The proposed solution was designed to enable demanding IP based applications. The network easily meets the infrastructure demands of bandwidth-intensive applications and limits the need to purchase or configure additional WAN technology. This service has very high availability so that interruptions are minimized.

This is a scalable and flexible service. With Comcast, your organization gets true any-to-any connectivity which allows traffic to move from any site to any other site within the network through a single Ethernet interface.

You will also have the ability to have a network solution that meets today's requirements but is capable of scaling to other locations or to meet future bandwidth demands. If, or when, you need additional network capacity, an upgrade agreement would be negotiated with Comcast and the billing terms would be specified in that agreement.

Finally, Comcast will supply dedicated access to the Internet using Comcast's Ethernet Dedicated Internet Service (EDI). EDI is a symmetrical, dedicated Internet access service provisioned on an Ethernet platform that is easy and fast to upgrade. Comcast will provision Internet connectivity for the sites to jointly access the Internet. Your organization will have the ability to scale that connection in 1 Mbps increments up to 10 Mbps or 10 Mbps increments up to 100 Mbps or 100 Mbps increments up to 10 Gbps depending on configuration.

Comcast service can easily scale to accommodate new bandwidth requirements. Comcast has uniquely diverse routing, commonly physically disparate from most other Telco provider's networks. Bandwidth can be added very quickly, often within hours.

With Comcast, your organization will leverage our extensive fiber network for a reliable and scalable network and connection to the Tier 1 Internet backbone using a simple Ethernet interface that allows for true plug and play compatibility. Additionally, with Comcast there are no local loop charges, typical with other service providers.

# COMCAST BUSINESS

## Summary

At each of the locations specified in this response, Comcast will install network edge equipment that will facilitate the connection between your network and ours. As part of the service, Comcast will provide, monitor and maintain the edge devices. Comcast also provides web-based monitoring and reporting tools available 24x7 upon request.

With Comcast you will receive a trusted data transport solution from the largest broadband provider offering unparalleled flexibility in configurations and pricing. Combine our years of commercial experience with leading edge innovative technology and service capabilities and differentiation among networking service providers becomes much clearer.

# COMCAST BUSINESS Technical Specifications

## Ethernet Network Service Description

### Service Description

Comcast Ethernet Network Service (ENS) enables customers to connect physically distributed locations across a Metropolitan Area Network (MAN) as if they are on the same Local Area Network (LAN). The service provides VLAN transparency enabling customers to implement their own VLANs without any coordination with Comcast. ENS is a reliable, more flexible, scalable, and cost-effective alternative to traditional hub and spoke network topologies using Frame Relay, TDM private lines or IP VPNs.



ENS offers three Classes of Service (CoS): Basic, Priority, and Premium. CoS options enable customers to select the CoS that best meets their applications' performance requirements. The service is offered with 10Mbps, 100Mbps, 1Gbps or 10Gbps Ethernet User-to-Network Interfaces (UNI) and is available in increments from 1Mbps to 10Gbps. The ENS Service is not available over the Comcast Hybrid Fiber Coax (HFC) Network.

Comcast's Ethernet Network Service is Certified MEF Compliant.

### Section 1. Technical Specifications

**1.1 Ethernet User-to-Network Interface.** The service provides bidirectional, full duplex transmission of Ethernet frames using a standard IEEE 802.3 Ethernet interface. Figure 1 lists the available UNI physical interfaces, their associated Committed Information Rate (CIR) bandwidth increments and the Committed Burst Sizes (CBS). CIR increments of less than 10Mbps are not available with Off-Net Services.

UNI Speed	UNI Physical Interface	CIR Increment	CBS (bytes)
10Mbps	10BaseT	1Mbps	25,000
100Mbps	100BaseT	10Mbps	250,000
1Gbps	1000BaseT or 1000BaseSX	100Mbps	2,500,000
10Gbps	10GBASE-SR or 10GBASE-LR	1000Mbps	25,000,000

Figure 1: Available UNI Interface types and CBS values for different CIR Increments

**1.2 Maximum number of UNIs.** The service supports up to 100 UNIs per network. Additional UNIs are considered on an Individual Case Basis (ICB).

**1.3 Class of Service Options.** The service offers three CoS options. The CoS options allow for differentiated service performance levels for different types of network traffic. It is used to prioritize customer mission-critical traffic from lesser priority traffic in the network. The customer must specify a CIR for each CoS to indicate how much bandwidth should be assigned to it. Figure 2 lists the service performance objectives associated with On-Net (for distances within 250 miles) and Off-Net Services. Only Basic CoS is permissible for Off-Net Services.

Performance Objective	Class of Service (CoS)		
	Premium	Priority	Basic
Latency (one way)	< 12ms	< 23ms	< 45ms
Jitter (one way)	< 2ms	< 23ms	< 45ms
Packet Loss (one way)	< 0.001%	< 0.01%	< 1%
Availability (On-Net Services delivered via Fiber)	> 99.99%	> 99.99%	> 99.99%
Availability (Off-Net Services)	Not Applicable	Not Applicable	> 99.95%

Figure 2: CoS Performance Objectives

**1.4 CoS Identification and Marking.** The customer must mark all packets using 802.1p CoS values as specified in Figure 3 to ensure the service will provide the intended CoS performance objectives specified in Figure 2. Locations delivered via Off-Net Services will not honor any CoS value other than Basic. All other values will be treated as Basic.

CoS	802.1p
Premium	5
Priority	2-3
Basic	0-1

Figure 3: CoS Marking

**1.5 Traffic Management.** Comcast's network traffic-policing policies restrict traffic flows to the subscribed CIR for each service class. If the customer-transmitted bandwidth rate for any CoS exceeds the subscription rate (CIR) and burst size (CBS), Comcast will discard this traffic. For packets marked with a non-conformant CoS marking, the service will transmit them using the Basic service class without altering the customer's CoS markings.

**1.6 MAC Addresses.** Comcast supports up to 250 MAC addresses per UNI and up to 2500 MAC addresses per ENS Domain.

**1.7 Maximum Frame Size.** The service supports a Maximum Transmission Unit (MTU) packet size of 1600 bytes to support untagged or 802.1Q tagged packet sizes. Jumbo Frame sizes can be supported on an Individual Case Basis (ICB).

**1.8 VLAN Tag Preservation.** The service supports IEEE 802.1Q VLAN-tagged customer packets. All customer VLAN IDs and priority code points (IEEE 802.1p) for CoS are transmitted and received unaltered by the service. Untagged packets are mapped to the native VLAN specified by customer. Customers may configure their own VLANs on their customer owned Customer Premise Equipment (CPE) without coordination with Comcast. Comcast may reserve one VLAN for network management purposes.

**1.9 Ethernet Service Frame Disposition.** Different types of Ethernet frames are processed differently by the service. Frames may pass unconditionally through the network or may be limited as in the case of broadcast, unknown unicast and multicast frames to ensure acceptable service performance. Refer to Figure 4 for Comcast's service frame disposition for each service frame type.

Service Frame Type	Service Frame Delivery
Unicast	All frames delivered unconditionally
Multicast	Frames delivered conditionally
Broadcast	Frames delivered conditionally

Figure 4: Service Frame Delivery Disposition

**1.10 Layer 2 Control Protocol (L2CP) Processing.** The service will discard, tunnel across the Comcast network, or peer (process) L2CP service frames at each UNI. Refer to Figure 5 for Comcast's L2CP disposition. For L2CPs with multiple disposition possibilities, the customer must specify to Comcast which disposition should be taken. The default disposition is to discard these L2CP service frames.



# COMCAST BUSINESS

Destination MAC Address	Layer 2 Control Protocol	L2CP Frame Disposition
01-80-C2-00-00-00	STP, RSTP, MSTP	Tunnel (All UNIs)
01-80-C2-00-00-01	PAUSE	Discard (All UNIs)
01-80-C2-00-00-02	LACP, LAMP	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-02	Link OAM	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-03	802.1X	Discard (All UNIs)
01-80-C2-00-00-07	E-LMI	Discard (All UNIs)
01-80-C2-00-00-0E	LLDP	Discard (All UNIs)
01-80-C2-00-00-20 through 01-80-C2-00-00-2F	GARP, MRP	Tunnel (All UNIs)

Figure 5: L2CP Frame Disposition

**1.11 Online Reporting.** Comcast provides the customer with password-protected access to online reports containing historical network traffic information. Reports may vary based on the customer solution.

## Section 2. Monitoring, Technical Support and Maintenance

**2.1 Network Monitoring.** Comcast monitors all Comcast Services purchased by a customer on a 24x7x365 basis.

**2.2 Technical Support.** Comcast provides customers a toll-free trouble reporting telephone number to the customer Enterprise Technical Support (ETS) that operates on a 24x7x365 basis. Comcast provides technical support for service-related inquiries. Technical support will not offer consulting or advice on issues relating to CPE not provided by Comcast.

**2.3 Escalation.** Reported troubles are escalated within the Comcast ETS to meet the standard restoration interval described in the Service Level Objectives. Troubles are escalated within the Comcast ETS as follows: Supervisor at the end of the standard interval plus one hour; to the Manager at the end of the standard interval plus two hours, and to the Director at the end of the standard interval plus four hours.

**2.4 Maintenance.** Comcast's standard maintenance window is Sunday to Saturday from 12:00am to 6:00am local time. Scheduled maintenance is performed during the maintenance window and will be coordinated between Comcast and the customer. Comcast provides a minimum of forty-eight (48) hour notice for non-service impacting scheduled maintenance. Comcast provides a minimum of seven (7) days notice for service impacting planned maintenance. Emergency maintenance is performed as needed.

## Section 3. Service Level Objectives

Comcast provides Service Level Objectives for the service, including network availability, mean time to respond, and mean time to restore. The service objectives are measured monthly from the Comcast point of demarcation.

**3.1 Availability.** Availability is a measurement of the percentage of total time that the service is operational when measured over a 30 day period. Service is considered "Inoperative" when either of the following occurs: (i) there is a total loss of signal for the service, (ii) output signal presented to the customer by Comcast does not conform to the technical specifications in Section 1.

**3.2 Mean Time to Respond.** Mean Time to Respond is the average time required for the ETS to begin troubleshooting a reported fault. The Mean Time to Respond objective is fifteen (15) minutes upon receipt of a fault notification or from the time a trouble ticket is opened with the ETS.

**3.3 Mean Time to Restore.** Mean Time to Restore is the average time required to restore service to an operational condition as defined by the technical specifications in Section 1 of this document. The Mean Time to Restore objective is four (4) hours for electronic equipment failure or six (6) hours for fiber optic facilities failure from the time a trouble ticket is opened with the ETS.

## Section 4. Customer Responsibilities

Comcast provides CPE for provisioning its services and the delivery of the UNI. Comcast will retain ownership and management responsibility for this CPE. As a result, the CPE must only be used for delivering Comcast services. Customers are required to shape their egress traffic to the contracted CIR.

Customers have the following responsibilities related to the installation, support, and maintenance of the Service.

**4.1** Provide an operating environment with temperatures not below fifty-five (55) or above eighty-five (85) degrees Fahrenheit. Humidity shall not exceed ninety (90) percent at eighty-five (85) degrees Fahrenheit.

**4.2** Provide secure space sufficient for access to one (1) standard, freestanding, equipment cabinet at each of the customer facilities, no further than fifty feet from the customer router or switch interface.

**4.3** Provide outside cable entry conduit(s), entry cable ground point, and internal building conduit to allow Comcast the ability to rod/rope a fiber optic cable to the point of demarcation.

**4.4** Locate and mark all private underground utilities (Water, Electric, etc.) along path of new underground placement not covered by utility companies.

**4.5** Provide a pull rope in any existing duct that Comcast is to use and ensure existing duct is serviceable for Comcast use.

**4.6** Obtain 'right-of-way' entry easement for Comcast facilities and equipment from property owners at each customer location.

**4.7** The customer is responsible for coring of the building's outside wall and internal walls. Upon request, Comcast can perform this activity on an 'as needed' basis for an additional one-time fee.

**4.8** Provide UPS AC power equipment, circuit sizing to be determined, if applicable.

**4.9** Emergency local generator backup service, if applicable.

**4.10** Provide access to the buildings and point of demarcation at each customer location to allow Comcast and its approved Contractors to install fiber for service installation. Provide access to each location for regular (8am - 5pm) and emergency (24 hour) service and maintenance of Comcast's equipment and facilities.

**4.11** Provide, install and maintain a device that is capable of routing network traffic between the Service and the customer's Local Area Network (LAN).

**4.12** Customer must provide a point of contact (POC) for installation, service activation and any maintenance activities.

## Section 5. Definitions

**5.1 Latency.** Latency, also known as Frame Delay, is defined as the maximum delay measured for a portion of successfully delivered service frames over a time interval.

**5.2 Jitter.** Jitter, also known as Frame Delay Variation, is defined as the short-term variations measured for a portion of successfully delivered service frames over a time interval.

**5.3 Packet Loss.** Packet Loss, also known as Frame Loss, is the difference between the number of service frames transmitted at the ingress UNI and the total number of service frames received at the egress UNI.

### Service Description

Comcast's Ethernet Dedicated Internet (EDI) Service provides a reliable, simpler, more flexible, and higher bandwidth options than T1 or SONET-based dedicated Internet access services. The service is offered with a 10Mbps, 100Mbps, 1Gbps or 10Gbps Ethernet User-to-Network Interface (UNI) in speed increments from 1Mbps to 10Gbps subject to available capacity. The service provides an Ethernet Virtual Connection (EVC) from the customer premises location to a Comcast Internet Point of Presence (POP) router.



### Section 1. Technical Specifications

**1.1 Ethernet User-to-Network Interface.** The service provides bidirectional, full duplex transmission of Ethernet frames using a standard IEEE 802.3 Ethernet interface. Figure 1 lists the available UNI physical interfaces, their associated Committed Information Rate (CIR) bandwidth increments and the Committed Burst Sizes (CBS).

UNI Speed	UNI Physical Interface	CIR Increments	CBS (Bursts)
10Mbps	10BaseT	1Mbps	25,000
100Mbps	100BaseT	10Mbps	250,000
1Gbps	1000BaseT or 1000BaseSX	100Mbps	2,500,000
10Gbps	10GBASE-SR or 10GBASE-LR	1000Mbps	25,000,000

Figure 1: Available UNI Interface types and CBS values for different CIR increments

**1.2 Traffic Management.** Comcast's network traffic-policing policies restrict traffic flows to the subscribed, Committed Information Rate (CIR). If the customer-transmitted bandwidth rate exceeds the subscription rate (CIR) and burst size (CBS), Comcast will discard the non-conformant packets. The customer's router must shape their traffic to their contracted CIR.

**1.3 Maximum Frame Size.** The service supports a maximum transmission unit (MTU) frame size of 1518 bytes including Layer 2 Ethernet header and FCS.

**1.4 Layer 2 Control Protocol (L2CP) Processing.** All L2CP frames are discarded at the UNI.

**1.5 IP Address Allocation.** IP address space is an essential requirement for all Internet access services. Comcast assigns eight (8) routable IPv4 addresses to each customer circuit. Customers can obtain additional IPv4 addresses if required. Customers may also request a /48 of IPv6 addresses if they would like to enable a native dual stack solution.

**1.6 Domain Name Service (DNS).** Comcast provides primary and secondary Domain Name Service (DNS). DNS is the basic network service that translates host and domain names into corresponding IP addresses, and vice-versa.

**1.7 Border Gateway Protocol (BGP) Routing.** Comcast supports BGP-4 routing as an optional service feature. BGP-4 allows customers to efficiently multi-home across multiple ISP networks. The service requires an Autonomous System Number (ASN) be assigned to a customer by the American Registry for Internet Numbers (ARIN). Customers should also be proficient in BGP routing protocol to provision and maintain the service on their router. Section 5 "Comcast BGP Policy" provides further details. Comcast supports private peering if the customer is multi-homed to Comcast's network only.

### Section 2. Monitoring, Technical Support and Maintenance

**2.1 Network Monitoring.** Comcast monitors all Comcast Services purchased by a customer on a 24x7x365 basis.

**2.2 Technical Support.** Comcast provides customers a toll-free trouble reporting telephone number to the customer Enterprise Technical Support (ETS) that operates on a 24x7x365 basis. Comcast provides technical support for service-related inquiries. Technical support will not offer consulting or advice on issues relating Customer Premise Equipment (CPE) not provided by Comcast.

**2.3 Escalation.** Reported troubles are escalated within the Comcast ETS to meet the standard restoration interval described in the Service Level Objectives. Troubles are escalated within the ETS as follows: Supervisor at the end of the standard interval plus one (1) hour; to the Manager at the end of the standard interval plus two (2) hours, and to the Director at the end of the standard interval plus four (4) hours.

**2.4 Maintenance.** Comcast's standard maintenance window is Sunday to Saturday from 12:00am to 6:00am local time. Scheduled maintenance is performed during the maintenance window and will be coordinated between Comcast and customer. Comcast provides a minimum of forty-eight (48) hour notice for non-service impacting scheduled maintenance. Comcast provides a minimum of seven (7) days notice for service impacting planned maintenance. Emergency maintenance is performed as needed.

### Section 3. Service Level Objectives

Comcast provides Service Level Objectives for the service, including network availability, mean time to respond, and mean time to restore. The service objectives are measured monthly from the Comcast point of demarcation.

**3.1 Availability.** Availability is a measurement of the percentage of total time that the service is operational when measured over a 30 day period. Service is considered "inoperative" when either of the following occurs: (i) there is a total loss of signal for the service, (ii) output signal presented to the customer by Comcast does not conform to the technical specifications in Section 1. Figure 2 lists the availability objectives for each access Ethernet access type.

On-Net Services (≤ 250 miles)	
Availability (On-Net Services delivered via Fiber)	> 99.99%
Availability (On-Net Services delivered via HFC Network)	> 99.9%
Off-Net Services	
Availability (Off-Net)	> 99.95%

Figure 2: Availability

**3.2 Mean Time to Respond.** Mean Time to Respond is the average time required for the ETS to begin troubleshooting a reported fault. The Mean Time to Respond objective is fifteen (15) minutes upon receipt of a fault notification or from the time a trouble ticket is opened with the ETS.

**3.3 Mean Time to Restore.** Mean Time to Restore is the average time required to restore service to an operational condition as defined by the technical specifications in Section 1 of this document. The Mean Time to Restore objective is four (4) hours for electronic equipment failure or six (6) hours for fiber optic facilities failure from the time a trouble ticket is opened with the ETS.

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## Section 4. Customer Responsibilities

Comcast provides CPE for provisioning its services and the delivery of the UNI. Comcast will retain ownership and management responsibility for this CPE. As a result, the CPE must only be used for delivering Comcast services. Customers are required to shape their egress traffic to the contracted CIR.

Customers have the following responsibilities related to the installation, support, and maintenance of the Service.

**4.1** Provide an operating environment with temperatures not below fifty-five (55) or above eighty-five (85) degrees Fahrenheit. Humidity shall not exceed ninety (90) percent at eighty-five (85) degrees Fahrenheit.

**4.2** Provide secure space sufficient for access to one (1) standard, freestanding, equipment cabinet at each of the customer facilities, no further than fifty feet from the customer router or switch interface.

**4.3** Provide outside cable entry conduit(s), entry cable ground point, and internal building conduit to allow Comcast the ability to rod/rope a fiber optic cable to the point of demarcation.

**4.4** Locate and mark all private underground utilities (Water, Electric, etc.) along path of new underground placement not covered by utility companies.

**4.5** Provide a pull rope in any existing duct that Comcast is to use and ensure existing duct is serviceable for Comcast use.

**4.6** Obtain 'right-of-way' entry easement for Comcast facilities and equipment from property owners at each customer location.

**4.7** The customer is responsible for coring of the building's outside wall and internal walls. Upon request, Comcast can perform this activity on an 'as needed' basis for an additional one-time fee.

**4.8** Provide UPS AC power equipment, circuit sizing to be determined, if applicable.

**4.9** Emergency local generator backup service, if applicable.

**4.10** Provide access to the buildings and point of demarcation at each customer location to allow Comcast and its approved Contractors to install fiber for service installation. Provide access to each location for regular (8am - 5pm) and emergency (24 hour) service and maintenance of Comcast's equipment and facilities.

**4.11** Provide, install and maintain a device that is capable of routing network traffic between the Service and the customer's Local Area Network (LAN).

**4.12** Customer must provide a point of contact (POC) for installation, service activation and any maintenance activities.

## Section 5. Comcast BGP Policy

The following provides the routing requirements to interconnect with the Comcast network. Additional details of Comcast's BGP inbound/outbound network policy and traffic engineering is available upon request.

**5.1** Customers must be multi-homed to run BGP, either:

- a. multi-homed within Comcast's network
- b. multi-homed with Comcast and another service provider

**5.2** Customers must use an Autonomous System (AS) number assigned by a regional registrar American Registry for Internet Numbers (ARIN), Réseaux IP Européens (RIPE), or Asia Pacific Network Information Centre (APNIC) etc. that is registered to their organization.

- a. All customer route announcements must be registered with a regional registrar. A route object must exist for each route prefix in one of the well known global routing registries such as RADB.
- b. The customer ASN needs to be verifiable in WHOIS database.
- c. Comcast will only accept private peering when the customer is multi-homed to Comcast only.
- d. Comcast will support a 4-byte ASN starting 01/01/2010 in accordance with ARIN policy.
- e. Comcast will assign a private ASN in the range of 64512-65534 for private peering and not accept any customer provided private ASN.
- f. Comcast will strip off the private ASN when advertising to peers.

**5.3** Customers must use a router that supports BGPv4.

- a. Comcast will not run BGPv4 with customers connected on a link with less than 2Mbps bandwidth.
- b. Customers are responsible to ensure their peering routers have adequate CPE processing power and memory space if a full Internet table is requested.
- c. Comcast will employ all best-known practices to establish, maintain, and troubleshoot BGPv4 sessions with all BGPv4 compliant router vendors. However, Comcast makes no warranty that it can establish and maintain a BGPv4 session with any CPE due to vendor interoperability.

**5.4** Customers can specify one of the following received-prefixes options:

- a. Default-route only
- b. Comcast customer routes
- c. Comcast customer routes + default-route
- d. Full routes
- e. Full routes + default-route

**5.5** Customer must be capable of configuring their BGP session with Comcast. This includes all setup of neighbor statements and all sanity checks on customer CPE.

**5.6** Comcast requests the use of an MD5 authentication key for all EBGP sessions. The customer should specify the MD5 password.

**5.7** Customers must prevent redistribution from their Interior Routing Protocol (IGP) into BGP. Customers should also apply restrictive filters on outbound announcements so that only the customer's intended outbound prefixes are announced to Comcast.

**5.8** Comcast will assign a /30 IP address for the interfaces that connect to Comcast's network. This will be assigned from a Comcast address block publicly registered with ARIN and already advertised as part of a larger aggregate to the Internet.

**5.9** Comcast will announce any portable or non-portable net block so long as this space is larger than /24, and the space is assigned to the customer via WHOIS or RWHOIS databases. If the net block does not belong to the customer and the net block is not already being announced from the customer's AS then Comcast will need to have an LOA (Letter of Agreement) from the true owner of the block stating that they are aware of, and are accepting of the fact that our customer wants to make the announcement through Comcast.

**5.10** Comcast does not alter any of its BGPv4 configurations, including route-maps, filter-policies, and communities, for any individual customer, but rather will dynamically alter BGP policy dependent on the customers' employment of predefined Comcast BGP communities. This ensures the Comcast network is built and maintained in a strategic, organized, and efficient fashion and reduces mean-time-to-repair for BGP related trouble.

# COMCAST BUSINESS

## Ethernet Private Line Description

### Service Description

Comcast Ethernet Private Line (EPL) Service is a reliable, more flexible, higher bandwidth alternative to traditional TDM Private Lines. The service enables customers to connect their Customer Premises Equipment (CPE) using a lower cost Ethernet interface. EPL enables customers to use any VLANs or Ethernet control protocol across the service without coordination with Comcast.



EPL provides one Ethernet Virtual Connection (EVC) between two customer locations. EPL offers three Classes of Service (CoS): Basic, Priority, and Premium. CoS options enable customers to select the CoS that best meets their applications' performance requirements. The service is offered with 10Mbps, 100Mbps, 1Gbps or 10Gbps Ethernet User-to-Network Interfaces (UNI) and is available in speed increments from 1Mbps to 10Gbps.

Comcast's Ethernet Private Line Service is Certified MEF Compliant.

### Section 1. Technical Specifications

**1.1 Ethernet User-to-Network Interface.** The service provides bidirectional, full duplex transmission of Ethernet frames using a standard IEEE 802.3 Ethernet interface. Figure 1 lists the available UNI physical interfaces, their associated Committed Information Rate (CIR) bandwidth increments and the Committed Burst Sizes (CBS). CIR increments of less than 10Mbps are not available with Off-Net Services.

UNI Speed	UNI Physical Interface	CIR Increment	CBS (bytes)
10Mbps	10BaseT	1Mbps	25,000
100Mbps	100BaseT	10Mbps	250,000
1Gbps	1000BaseT or 1000BaseSX	100Mbps	2,500,000
10Gbps	10GBASE-SR or 10GBASE-LR	1000Mbps	25,000,000

Figure 1: Available UNI interface types and CBS values for different CIR increments

**1.2 Class of Service Options.** The service offers three CoS options. The CoS options allow for differentiated service performance levels for different types of network traffic. It is used to prioritize customer mission-critical traffic over lesser priority traffic in the network. The customer must specify a CIR for each CoS to indicate how much bandwidth should be assigned to it. Figure 2 lists the service performance objectives associated with On-Net (for distances within 250 network miles) and Off-Net Services. Only Basic CoS is permissible for Off-Net Services and On-Net Services delivered via the Comcast Hybrid Fiber Coax (HFC) Network.

Performance Objective	Class of Service (CoS)		
	Premium	Priority	Basic
On-Net Services (≤ 250 miles)			
Latency (one way)	< 12ms	< 23ms	< 45ms
Jitter (one way)	< 2ms	< 23ms	< 45ms
Packet Loss (one way)	< 0.001%	< 0.01%	< 1%
Availability (On-Net Services delivered via Fiber)	> 99.99%	> 99.99%	> 99.99%
Availability (On-Net Services delivered via HFC Network)	Not Applicable	Not Applicable	> 99.9%
Off-Net Services			
Availability	Not Applicable	Not Applicable	> 99.95%

Figure 2: CoS Performance Objectives

**1.3 CoS Identification and Marking.** Customers must mark all packets using 802.1p CoS values as specified in Figure 3 to ensure the service will provide the intended CoS performance objectives specified in Figure 2. Locations delivered via Off-Net Services or On-Net Services delivered via the HFC Network will not honor any CoS value other than Basic. All other values will be treated as Basic.

CoS	802.1p
Premium	5
Priority	2-3
Basic	0-1

Figure 3: CoS Marking

**1.4 Traffic Management.** Comcast's network traffic-policing policies restrict traffic flows to the subscribed CIR for each service class. If the customer-transmitted bandwidth rate for any CoS exceeds the subscription rate (CIR) and burst size (CBS), Comcast will discard the non-conformant packets. For packets marked with a non-conformant CoS marking, the service will transmit them using the Basic service class without altering the customer's CoS markings.

**1.5 Maximum Frame Size.** The service supports a Maximum Transmission Unit (MTU) packet size of 1600 bytes to support untagged or 802.1Q tagged packet sizes. Jumbo Frame sizes can be supported on an Individual Case Basis (ICB). For On-Net Services delivered via the Comcast HFC Network, frame sizes may not exceed 1518 MTU size (1522 with a single VLAN tag). All frames that exceed specifications shall be dropped.

**1.6 VLAN Tag Preservation.** The service supports IEEE 802.1Q VLAN-tagged customer packets. All customer VLAN IDs and priority code points (IEEE 802.1p) for CoS are transmitted and received unaltered by the service. Untagged packets are mapped to the native VLAN specified by customer. Customers may configure their own VLANs on their customer owned CPE without coordination with Comcast. Comcast may reserve one VLAN for network management purposes.

**1.7 Ethernet Service Frame Disposition.** The service delivers all service frames associated with the EVC unconditionally across the network as specified in Figure 4.

Service Frame Type	Service Frame Delivery
Unicast	All frames delivered unconditionally
Multicast	All frames delivered unconditionally
Broadcast	All frames delivered unconditionally

Figure 4: Service Frame Delivery Disposition

**1.8 Layer 2 Control Protocol (L2CP) Processing.** Certain L2CP frames are discarded at the UNI, tunneled across the Comcast network or peered at (processed by) the UNI. Refer to Figure 5 for Comcast's L2CP disposition. For L2CPs with multiple disposition possibilities, the customer must specify to Comcast which disposition should be taken. The default disposition is to discard these L2CP service frames.

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Destination MAC Address	Layer 2 Control Protocol	L2CP Frame Disposition
01-80-C2-00-00-00	STP, RSTP, MSTP	Tunnel (All UNIs)
01-80-C2-00-00-01	PAUSE	Discard (All UNIs)
01-80-C2-00-00-02	LACP, LAMP	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-02	Link OAM	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-03	802.1X	Tunnel (All UNIs)
01-80-C2-00-00-07	E-LMI	Tunnel (All UNIs)
01-80-C2-00-00-0E	LLDP	Tunnel (All UNIs)
01-80-C2-00-00-20 through 01-80-C2-00-00-2F	GARP, MRP	Tunnel (All UNIs)

Figure 5: L2CP Frame Disposition

## Section 2. Monitoring, Technical Support and Maintenance

**2.1 Network Monitoring.** Comcast monitors all Comcast Services purchased by a customer on a 24x7x365 basis.

**2.2 Technical Support.** Comcast provides customers a toll-free trouble reporting telephone number to the customer Enterprise Technical Support (ETS) that operates on a 24x7x365 basis. Comcast provides technical support for service-related inquiries. Technical support will not offer consulting or advice on issues relating CPE not provided by Comcast.

**2.3 Escalation.** Reported troubles are escalated within the Comcast ETS to meet the standard restoration interval described in the Service Level Objectives. Troubles are escalated within the Comcast ETS as follows: Supervisor at the end of the standard interval plus one hour; to the Manager at the end of the standard interval plus two hours, and to the Director at the end of the standard interval plus four hours.

**2.4 Maintenance.** Comcast's standard maintenance window is Sunday to Saturday from 12:00am to 6:00am local time. Scheduled maintenance is performed during the maintenance window and will be coordinated between Comcast and the customer. Comcast provides a minimum of forty-eight (48) hour notice for non-service impacting scheduled maintenance. Comcast provides a minimum of seven (7) days notice for service impacting planned maintenance. Emergency maintenance is performed as needed.

## Section 3. Service Level Objectives

Comcast provides Service Level Objectives for the service, including network availability, mean time to respond, and mean time to restore. The service objectives are measured monthly from the Comcast point of demarcation.

**3.1 Availability.** Availability is a measurement of the percentage of total time that the service is operational when measured over a 30 day period. Service is considered "Inoperative" when either of the following occurs: (i) there is a total loss of signal for the service, (ii) output signal presented to the customer by Comcast does not conform to the technical specifications in Section 1.

**3.2 Mean Time to Respond.** Mean Time to Respond is the average time required for the ETS to begin troubleshooting a reported fault. The Mean Time to Respond objective is fifteen (15) minutes upon receipt of a fault notification or from the time a trouble ticket is opened with the ETS.

**3.3 Mean Time to Restore.** Mean Time to Restore is the average time required to restore service to an operational condition as defined by the technical specifications in Section 1 of this document. The Mean Time to Restore objective is four (4) hours for electronic equipment failure or six (6) hours for fiber optic facilities failure from the time a trouble ticket is opened with the ETS.

## Section 4. Customer Responsibilities

Comcast provides CPE for provisioning its services and the delivery of the UNI. Comcast will retain ownership and management responsibility for this CPE. As a result, the CPE must only be used for delivering Comcast services. Customers are required to shape their egress traffic to the contracted CIR.

**Customers have the following responsibilities related to the installation, support, and maintenance of the Service.**

**4.1** Provide an operating environment with temperatures not below fifty-five (55) or above eighty-five (85) degrees Fahrenheit. Humidity shall not exceed ninety (90) percent at eighty-five (85) degrees Fahrenheit.

**4.2** Provide secure space sufficient for access to one (1) standard, freestanding, equipment cabinet at each of the customer facilities, no further than fifty feet from the customer router or switch interface.

**4.3** Provide outside cable entry conduit(s), entry cable ground point, and internal building conduit to allow Comcast the ability to rod/rope a fiber optic cable to the point of demarcation.

**4.4** Locate and mark all private underground utilities (Water, Electric, etc.) along path of new underground placement not covered by utility companies.

**4.5** Provide a pull rope in any existing duct that Comcast is to use and ensure existing duct is serviceable for Comcast use.

**4.6** Obtain 'right-of-way' entry easement for Comcast facilities and equipment from property owners at each customer location.

**4.7** The customer is responsible for coring of the building's outside wall and internal walls. Upon request, Comcast can perform this activity on an 'as needed' basis for an additional one-time fee.

**4.8** Provide UPS AC power equipment, circuit sizing to be determined, if applicable.

**4.9** Emergency local generator backup service, if applicable.

**4.10** Provide access to the buildings and point of demarcation at each customer location to allow Comcast and its approved Contractors to install fiber for service installation. Provide access to each location for regular (8am - 5pm) and emergency (24 hour) service and maintenance of Comcast's equipment and facilities.

**4.11** Provide, install and maintain a device that is capable of routing network traffic between the Service and the customer's Local Area Network (LAN).

**4.12** Customer must provide a point of contact (POC) for installation, service activation and any maintenance activities.

## Section 5. Definitions

**5.1 Latency.** Latency, also known as Frame Delay, is defined as the maximum delay measured for a portion of successfully delivered service frames over a time interval.

**5.2 Jitter.** Jitter, also known as Frame Delay Variation, is defined as the short-term variations measured for a portion of successfully delivered service frames over a time interval.

**5.3 Packet Loss.** Packet Loss, also known as Frame Loss, is the difference between the number of service frames transmitted at the Ingress UNI and the total number of service frames received at the egress UNI.

### Service Description

Comcast Ethernet Virtual Private Line (EVPL) Service provides an Ethernet Virtual Connection (EVC) between two customer locations similar to Ethernet Private Line service but supports the added flexibility to multiplex multiple services (EVCs) on a single UNI at a customer's hub or aggregation site. The service is a reliable, more flexible, higher bandwidth and cost effective alternative to traditional TDM Private Lines, Frame Relay or ATM Layer 2 VPNs and IP VPNs.



EVPL offers three Classes of Service (CoS) including: Basic, Priority, and Premium. CoS options enable customers to select the CoS that best meets their applications' performance requirements. The service is offered with 10Mbps, 100Mbps, 1Gbps or 10Gbps Ethernet User-to-Network Interfaces (UNI) and is available in speed increments from 1Mbps to 10Gbps.

Comcast's Ethernet Network Service is Certified MEF Compliant.

### Section 1. Technical Specifications

**1.1 Ethernet User-to-Network Interface.** The service provides bidirectional, full duplex transmission of Ethernet frames using a standard IEEE 802.3 Ethernet interface. Figure 1 lists the available UNI physical interfaces, their associated Committed Information Rate (CIR) bandwidth increments and the Committed Burst Sizes (CBS). CIR increments of less than 10Mbps are not available with Off-Net Services.

UNI Speed	UNI Physical Interface	CIR Increments	CBS (bytes)
10Mbps	10BaseT	1Mbps	25,000
100Mbps	100BaseT	10Mbps	250,000
1Gbps	1000BaseT or 1000BaseSX	100Mbps	2,500,000
10Gbps	10GBASE-SR or 10GBASE-LR	1000Mbps	25,000,000

Figure 1: Available UNI interface types and CBS values for different CIR increments

**1.2 Service Multiplexing.** The service enables customers to multiplex multiple services (EVCs) on a given UNI. A typical application for EVPL is to upgrade a hub and spoke topology where several remote (spoke) sites need to connect to a regional or central (hub) site. The hub site can have all remote site EVCs multiplexed on a single UNI eliminating the need for multiple ports on the customer's router or Ethernet switch. Note that when service multiplexing is used, the sum of CIR bandwidth for all EVCs multiplexed at the UNI cannot exceed the UNI port speed. The service multiplexing capability is not available at sites served by the Comcast Hybrid Fiber Coax (HFC) Network.

**1.3 Class of Service Options.** The service offers three classes of service. The CoS options allow for differentiated service performance levels for different types of network traffic. It is used to prioritize customer mission-critical traffic over lesser priority traffic in the network. The customer must specify a CIR for each CoS to indicate how much bandwidth should be assigned to it. Figure 2 lists the service performance objectives associated with On-Net (for distances within 250 network miles) and Off-Net Services. Only Basic CoS is permissible for Off-Net Services and On-Net Services delivered via the HFC Network.

Performance Objectives	Class of Service (CoS)		
	Premium	Priority	Basic
Latency (one way)	< 12ms	< 23ms	< 45ms
Jitter (one way)	< 2ms	< 23ms	< 45ms
Packet Loss (one way)	< 0.001%	< 0.01%	< 1%
Availability (On-Net Services delivered via Fiber)	> 99.99%	> 99.99%	> 99.99%
Availability (On-Net Services delivered via HFC Network)	Not Applicable	Not Applicable	> 99.9%
Availability (Off-Net Services)	Not Applicable	Not Applicable	> 99.95%

Figure 2: CoS Performance Objectives

**1.4 CoS Identification and Marking.** Customers must mark all packets using 802.1p CoS values as specified in Figure 3 to ensure the service will provide the intended CoS performance objectives specified in Figure 2. Locations delivered via Off-Net Services or On-Net Services delivered via the HFC Network will not honor any CoS value other than Basic. All other values will be treated as Basic.

CoS	802.1p
Premium	5
Priority	2-3
Basic	0-1

Figure 3: CoS Marking

**1.5 Traffic Management.** Comcast's network traffic-policing policies restrict traffic flows to the intended CIR for each service class. If the customer-transmitted bandwidth rate for any CoS exceeds the subscription rate (CIR) and burst size (CBS), Comcast will discard the non-conformant packets. For packets marked with a non-conformant CoS marking, the service will transmit them using the Basic service class without altering the customer's CoS markings.

**1.6 Maximum Frame Size.** The service supports a Maximum Transmission Unit (MTU) frame size of 1600 bytes to support untagged or 802.1Q tagged frame sizes. Jumbo Frame sizes can be supported on an individual Case Basis (ICB). For On-Net Services delivered via the Comcast HFC Network, frame sizes may not exceed 1518 MTU size (1522 with a single VLAN tag). All frames that exceed specifications shall be dropped.

**1.7 VLAN Tag Preservation.** The service supports IEEE 802.1Q VLAN-tagged customer frames. All customer VLAN IDs and priority code points (IEEE 802.1p) for CoS conforming to the C-VLAN/EVC map are transmitted and received unaltered by the service. If a native VLAN is specified by the customer in the C-VLAN/EVC map, untagged frames are mapped to the native VLAN and transmitted over the corresponding EVC. Customers must coordinate their C-VLAN add/delete/change with Comcast. Comcast may reserve one VLAN for network management purposes.

**1.8 Standard number of EVCs per UNI:** up to 20 for Off-Net Services and On-Net Services delivered via fiber. Additional EVCs are available, charges may apply. Only one EVC is permitted for On-Net Services delivered via the Comcast HFC Network.

**1.9 Standard number of VLAN IDs per EVC:** up to 20. Additional VLAN IDs are available, charges may apply. Only 1 VLAN ID is permitted for On-Net Services delivered via the HFC Network.

**1.10 Ethernet Service Frame Disposition.** All Frames are delivered conditionally through the network based on which EVCs they are sent to as specified in the VLAN ID to EVC map provided by the customer. Refer to Figure 4 for Comcast's service frame disposition for each service frame type.

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Service Frame Type	Service Frame Delivery
Unicast	Frames delivered conditionally
Multicast	Frames delivered conditionally
Broadcast	Frames delivered conditionally

Figure 4: Service Frame Delivery Disposition

**1.11 Layer 2 Control Protocol (L2CP) Processing.** Certain L2CP frames are discarded at the UNI, tunneled across the Comcast network or peered at (processed by) the UNI. Refer to Figure 5 for Comcast's L2CP disposition. For L2CPs with multiple disposition possibilities, the customer must specify to Comcast which disposition should be taken. The default disposition is to discard these L2CP service frames.

Destination MAC Address	Layer 2 Control Protocol	L2CP Frame Disposition
01-80-C2-00-00-00	STP, RSTP, MSTP	Discard (All UNIs)
01-80-C2-00-00-01	PAUSE	Discard (All UNIs)
01-80-C2-00-00-02	LACP, LAMP	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-02	Link OAM	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-03	802.1X	Discard (All UNIs)
01-80-C2-00-00-07	E-LMI	Discard (All UNIs)
01-80-C2-00-00-0E	LLDP	Discard (All UNIs)
01-80-C2-00-00-20 through 01-80-C2-00-00-2F	GARP, MRP	Tunnel (All UNIs)

Figure 5: L2CP Frame Disposition

## Section 2. Monitoring, Technical Support and Maintenance

**2.1 Network Monitoring.** Comcast monitors all Comcast Services purchased by a customer on a 24x7x365 basis.

**2.2 Technical Support.** Comcast provides customers a toll-free trouble reporting telephone number to the customer Enterprise Technical Support (ETS) that operates on a 24x7x365 basis. Comcast provides technical support for service-related inquiries. Technical support will not offer consulting or advice on issues relating Customer Premise Equipment (CPE) not provided by Comcast.

**2.3 Escalation.** Reported troubles are escalated within the Comcast ETS to meet the standard restoration interval described in the Service Level Objectives. Troubles are escalated within the ETS as follows: Supervisor at the end of the standard interval plus one (1) hour; to the Manager at the end of the standard interval plus two (2) hours, and to the Director at the end of the standard interval plus four (4) hours.

**2.4 Maintenance.** Comcast's standard maintenance window is Sunday to Saturday from 12:00am to 6:00am local time. Scheduled maintenance is performed during the maintenance window and will be coordinated between Comcast and customer. Comcast provides a minimum of forty-eight (48) hour notice for non-service impacting scheduled maintenance. Comcast provides a minimum of seven (7) days notice for service impacting planned maintenance. Emergency maintenance is performed as needed.

## Section 3. Service Level Objectives

Comcast provides Service Level Objectives for the service, including network availability, mean time to respond, and mean time to restore. The service objectives are measured monthly from the Comcast point of demarcation.

**3.1 Availability.** Availability is a measurement of the percentage of total time that the service is operational when measured over a 30 day period. Service is considered "inoperative" when either of the following occurs: (i) there is a total loss of signal for the service, (ii) output signal presented to the customer by Comcast does not conform to the technical specifications in Section 1.

**3.2 Mean Time to Respond.** Mean Time to Respond is the average time required for the ETS to begin troubleshooting a reported fault. The Mean Time to Respond objective is fifteen (15) minutes upon receipt of a fault notification or from the time a trouble ticket is opened with the ETS.

**3.3 Mean Time to Restore.** Mean Time to Restore is the average time required to restore service to an operational condition as defined by the technical specifications in Section 1 of this document. The Mean Time to Restore objective is four (4) hours for electronic equipment failure or six (6) hours for facilities failure from the time a trouble ticket is opened with the ETS.

## Section 4. Customer Responsibilities

Comcast provides CPE for provisioning its services and the delivery of the UNI. Comcast will retain ownership and management responsibility for this CPE. As a result, the CPE must only be used for delivering Comcast services. Customers are required to shape their egress traffic to the contracted CIR.

**Customers have the following responsibilities related to the installation, support, and maintenance of the Service.**

**4.1** Provide an operating environment with temperatures not below fifty-five (55) or above eighty-five (85) degrees Fahrenheit. Humidity shall not exceed ninety (90) percent at eighty-five (85) degrees Fahrenheit.

**4.2** Provide secure space sufficient for access to one (1) standard, freestanding, equipment cabinet at each of the customer facilities, no further than fifty feet from the customer router or switch interface.

**4.3** Provide outside cable entry conduit(s), entry cable ground point, and internal building conduit to allow Comcast the ability to rod/rope a fiber optic cable to the point of demarcation.

**4.4** Locate and mark all private underground utilities (Water, Electric, etc.) along path of new underground placement not covered by utility companies.

**4.5** Provide a pull rope in any existing duct that Comcast is to use and ensure existing duct is serviceable for Comcast use.

**4.6** Obtain 'right-of-way' entry easement for Comcast facilities and equipment from property owners at each customer location.

**4.7** The customer is responsible for coring of the building's outside wall and internal walls. Upon request, Comcast can perform this activity on an 'as needed' basis for an additional one-time fee.

**4.8** Provide UPS AC power equipment, circuit sizing to be determined, if applicable.

**4.9** Emergency local generator backup service, if applicable.

**4.10** Provide access to the buildings and point of demarcation at each customer location to allow Comcast and its approved Contractors to install fiber for service installation. Provide access to each location for regular (8am - 5pm) and emergency (24 hour) service and maintenance of Comcast's equipment and facilities.

**4.11** Provide, install and maintain a device that is capable of routing network traffic between the Service and the customer's Local Area Network (LAN).

**4.12** Customer must provide a point of contact (POC) for installation, service activation and any maintenance activities.

## Section 5. Definitions

**5.1 Latency.** Latency, also known as Frame Delay, is defined as the maximum delay measured for a portion of successfully delivered service frames over a time interval.

**5.2 Jitter.** Jitter, also known as Frame Delay Variation, is defined as the short-term variations measured for a portion of successfully delivered service frames over a time interval.

**5.3 Packet Loss.** Packet Loss, also known as Frame Loss, is the difference between the number of service frames transmitted at the ingress UNI and the total number of service frames received at the egress UNI.

# COMCAST BUSINESS

## Solution Provisioning and Project Plan

Typical site installations may take anywhere from 60 to 90 days for completion. Throughout the duration of the project a dedicated Comcast account team will be in contact providing status and answering any questions you may have.

### Project Kickoff Meeting

Comcast Business Communications, LLC project management team will conduct a "Customer Implementation Call" to discuss the overall project. Each location will be discussed for accuracy in terms of relay rack space, appropriate power, etc.

### Comcast Service Delivery Major Milestones:

- **Outside and Inside Surveys** – Comcast will conduct outside plant and customer site surveys.
- **Permits & Right of Entry Agreements** – Comcast will obtain required permits and work with property owner to obtain Right of Entry/Access agreements.
- **Service Configurations** – Comcast National Team will implement Network Core Configurations.
- **Outside and Inside Fiber/Coax Construction** – Comcast will complete outside and inside construction.
- **Customer Premise Equipment Installation/Plant Test Date (PTD)** – Comcast will dispatch to the customer's premise to install CPE, connect CPE to Fiber, and call Comcast Test & Turn-up to complete plant test.
- **Firm Order Commit (FOC)** – Comcast Service will be available to the customer. **FOC is 90 calendar days from customer signature.**

### Comcast Responsibilities:

- Construct all OSP and ISP fiber optic cabling up to the agreed upon locations from the site survey forms and connect number of sites (XX) locations.
- Call for locates of public utilities in the right of way.
- Restoration of disturbed grounds.
- Assemble, configure and install all Comcast provided network equipment on customer premise.
- Test and verify all appropriate fiber connections.
- Test and verify all appropriate data interfaces/connections and verify throughput.
- Provide 24x7x365 network monitoring.
- Provide contact list information including escalation procedures and NOC information.
- Provide documentation detail services including customer network interface drawings.
- And any additional agreements per site survey document.

**Additional information can be provided upon request.**

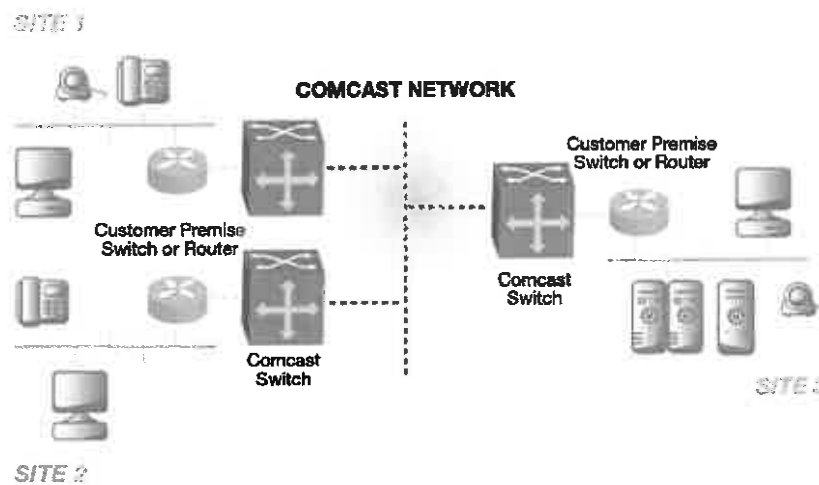


# COMCAST BUSINESS

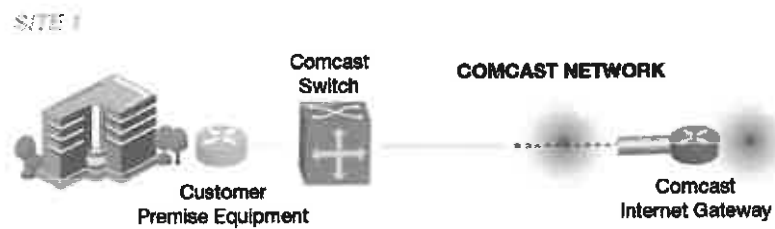
## Network Diagram

Logical drawing

### ENS Services



### EDI Services

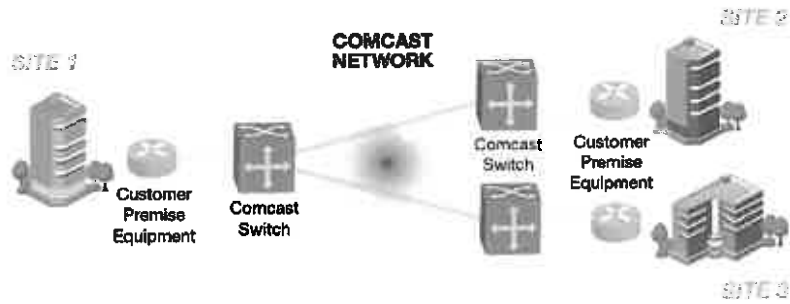


*"Illustrative Diagram – Actual installation may differ.*

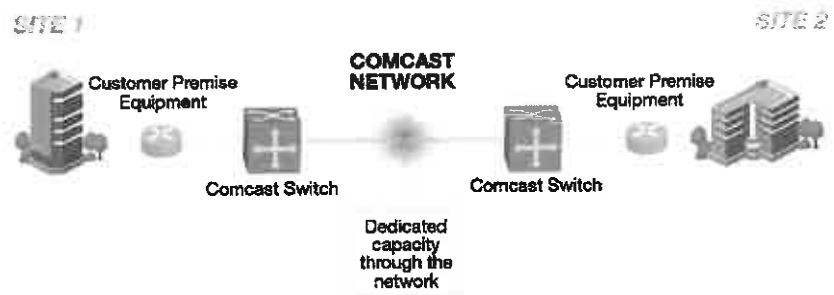
# COMCAST BUSINESS

Logical drawing

## EVPL Services



## EPL Services



*"Illustrative Diagram – Actual installation may differ*

# COMCAST BUSINESS

## Company Background

Comcast was founded in 1963 as a single-system cable operator and now is the nation's largest with over \$62 billion in revenue in 2012. We are one of the nation's leading providers of information, communications and entertainment products and services with over 19 million Internet customers, 10 million digital voice customers, 22 million video customers and hundreds of thousands of business customers.

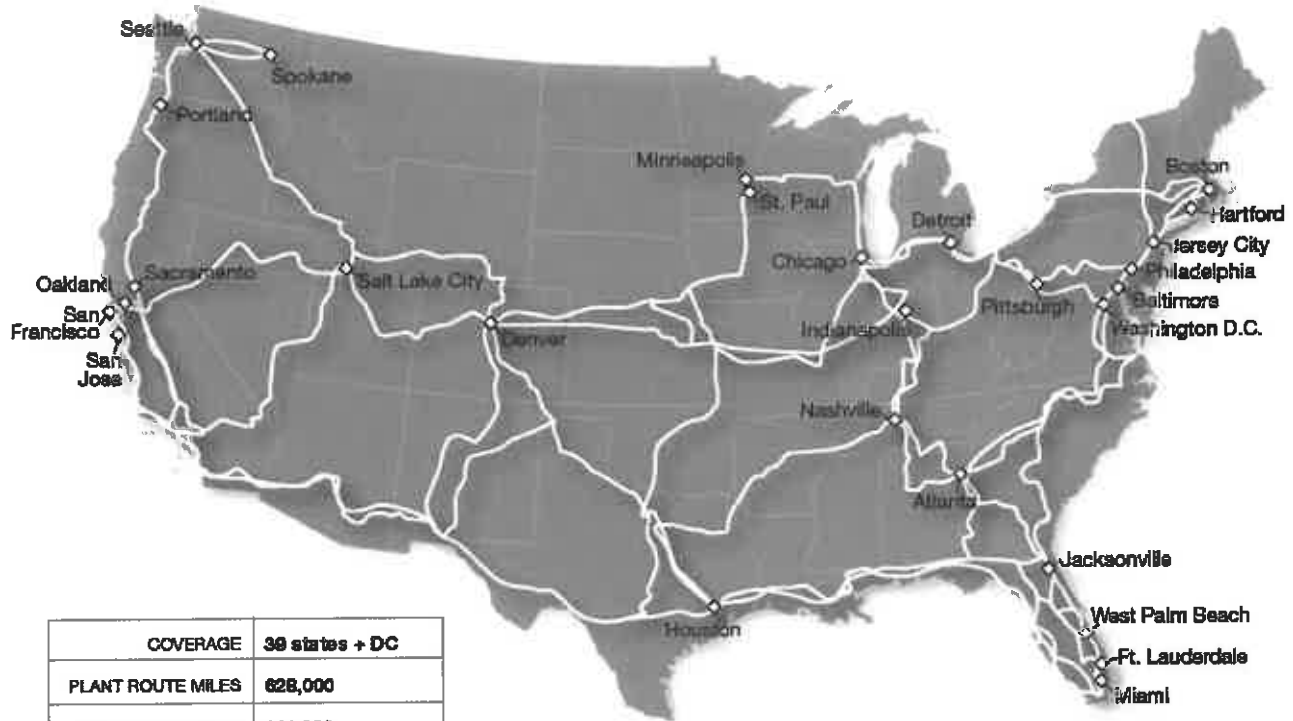
With over 135,000 employees, we currently serve 20 of the top Metropolitan Statistical Areas (MSAs) in the U.S. and provide service to customers in 39 states and the District of Columbia.

Our high-speed, high-capacity broadband and Ethernet services operate across our private, diverse enhanced fiber network. With over 141,000 national route miles of fiber, **our network is the largest facilities-based last mile alternative to the phone company.**

With the first and largest fully 40G backbone, and the deployment of the first 100G router interface, Comcast's advanced network delivers reliable and scalable services for businesses of any size.

**COMCAST EXTENSIVE NATIONWIDE FIBER OPTIC NETWORK  
THE LARGEST FACILITIES-BASED, LAST MILE ALTERNATIVE TO THE PHONE  
COMPANY IN THE UNITED STATES.**

# COMCAST BUSINESS



COVERAGE	<b>39 states + DC</b>
PLANT ROUTE MILES	<b>628,000</b>
FIBER ROUTE MILES	<b>141,000</b>
OPTICAL NODES	<b>125,000</b>
TRAFFIC TYPE	<b>95% commercial or customer of a directed peer</b>

Comcast Business Communications, LLC is a unit of Comcast Corporation, owner of the largest cable communications company in the United States and headquartered in Philadelphia. Building upon Comcast’s and its subsidiaries’ reputation as pioneers in developing innovative broadband communications products and services for consumers, Comcast is bringing innovative technology and service capabilities to businesses, government and educational organizations within Comcast Cable markets.

Comcast Business Communications leverages and augments Comcast’s network with next-generation optical and access technologies to offer Internet and other data services directly to customers. An extensive fiber network, delivering unmatched broadband capacity, and a commitment to customer service, enables Comcast to deliver superior broadband services to range of all businesses and organizations — small, medium, and large.

Consistent with Comcast’s business strategy to deliver unprecedented bandwidth, network reach, and a superior customer experience, Comcast has invested in state-of-the-art network technologies, business and operating support systems, as well as network professionals. These investments have resulted in scalable services, an all-fiber backbone network, and superior service levels for those businesses and organizations served in the Comcast markets. In addition, the extensive footprint of the network allows

# COMCAST BUSINESS

Comcast to deliver coaxial and fiber capacity to many business locations that have been historically underserved by other network providers.

Among the services that Comcast and its affiliates provide are several that they have helped pioneer, including high-speed commercial cable-modem-based Internet services.

For more information on Comcast visit <http://www.business.comcast.com>.

## **Financial Qualifications**

Comcast is a wholly owned, indirect subsidiary of Comcast Corporation, from which Comcast receives its funding. As such, Comcast is not publicly held and does not release stand-alone financial results or associated financial information, except in limited circumstances to the extent required by law, and then, only under seal or a proprietary protective order. Please refer to the publicly filed external consolidated Comcast financial statements and earnings press releases posted at the Comcast Corporate web page: <http://www.cmcsk.com>.

# COMCAST BUSINESS

## Operations

Comcast provides high-quality service and effective maintenance of our network and customer base in several key business areas. These include: Network Operations and Field Operations. Comcast strongly suggests that all personnel involved in the decision process visit the network operations facilities of each of the bidders as part of the evaluation process.

### Network Operations

The Network Operations organization provides World Class Enterprise Customer Care, which includes surveillance, trouble-shooting, and resolution through its state-of-the-art 24 x 7 x 365 Network Operations Center (NOC) with two redundant Customer Care Centers in Naperville, IL and Denver, CO. Each staffed to answer any questions, perform changes to existing services and assist with technical troubles. Both Customer Care Centers are collocated with Enterprise Tier II and Tier III repair groups, easily facilitating higher level technical support. The NOC continuously monitors the network equipment, service health, and performance of the Comcast network, responds to network events and service degradations, dispatches local field technicians, and informs customers of service issues, in many cases before the customer has noticed the problem. The Network Operations group also provides technical support and responds to trouble calls from network service customers including carriers, TLS and Native ATM customers, and voice product customers, through a staff of Technical Support Representatives (TSRs). The Comcast NOC also operates a 24 x 7 x 365 Technical Customer Support helpdesk that responds to calls for all of Comcast services.

The NOC maintains a staff of engineers and technicians with an average of 12 years tenure, ensuring business continuity are trained in an array of networks, elements, and technologies in the Comcast network (Ethernet, ATM, Frame Relay, SONET, T-1/T-3, local and long distance telephony, Internet Access, and LAN/WAN based services). Comcast engineers and technicians have earned many industry certifications, including: CCIE (Cisco Certified Internetwork Expert), Cisco Certified Network Associate (CCNA), Cisco Certified Network Professional (CCNP), Microsoft Certified Systems Engineer (MCSE), A+, Network+, and other certifications in specific vendor equipment.

**One-Stop-Shop** – Care for all levels of Business products.

**Planned Maintenance** – Seven day advanced notice to Metro Ethernet and Advanced Voice Customers which include Trunking and Hosted PBC products.

**Dedicated Project Managers** to ensure accurate and timely delivery of all Comcast products. Project Managers are your single Point of Contact.

**Proactive Monitoring** at the customer premise level allows quick resolution to network issues with the fastest response time in the industry. 50% of all tickets are generated by our Customer Monitoring Center – we see the problem before our customers do!

**World Class Enterprise Monitoring** - Comcast has a robust set of tools to detect and isolate faults from network infrastructure to CPE issues.

# COMCAST BUSINESS

## **NOC End user support and Escalation Procedures**

The NOC is organized with a standard 3-tier escalation configuration with automatic escalation intervals. Tier 4 support is escalated to Comcast's Network Engineering Department. The NOC is staffed 24 x 7 x 365. Technicians remain on call 7 x 24 to assist with major problems. The NOC may also dispatch technicians 7 x 24. Customers are welcome to request to speak with a supervisor or manager at any time.

# COMCAST BUSINESS

## Comcast Escalation Procedures

### Business Hours

Priority	Shift Lead	Manager	Director	Vice-President
1	15 Mins	30 Mins	1 Hour	3 Hours
2	1 Hour	2 Hours	4 Hours	12 hours
3	2 Hours	4 hours	12 Hours	-

### Non-Business Hours

Priority	Shift Lead	Manager	Director	Vice-President
1	1 Hour	2 Hours	6 hours	8 hours
2	2 hours	4 Hours	12 Hours	-
3	6 hours	12 Hours	-	-

### Priority Definition

- 1) Total outage; multiple customers or multiple locations.
- 2) Total outage, single customer/single location, or partial outage of multiple customers or multiple locations
- 3) Partial outage, single customer or location

### Service Level Objectives

In the event of a service interruption, Comcast shall use commercially reasonable efforts to respond to the service interruption and to clear the service interruption within the time frames set forth below. Comcast shall notify customer that Comcast has dispatched its personnel to effect restoration and repair and shall inform customer when service has been restored.

Category	Objective
Network Availability	99.99%
Mean Time to respond telephonically to call	30 minutes
Mean time to restore equipment	4 hours
Mean time to restore fiber	6 hours



# COMCAST BUSINESS

## Network Management Reporting

Customer will be given a secure web login to review the external reporting data at their convenience. Network management reports will include the following reporting elements:

- Service Availability (Uptime) in percentage of day per connection
- Packet discard percentage, per connection
- Average Throughput, per connection, per Hour for the past day, 7 day and 30 day intervals.

## Field Operations

The role of Field Operations in Comcast is two-fold. First, Field Operations provides an effective field presence for technical support of our core (ATM, IP, Optical) network. They perform on-site repairs and trouble-shooting on a daily, ongoing basis and dispatch field technicians to support our voice switches and other hardware. These field crews are the “on-site” presence to remedying any network trouble.

Second, Field Operations provides leadership for customer installations. Field Operations Project Coordinators are assigned to each new account to singularly manage the local work required for each install. The Project Coordinator manages the dispatch of local technicians to install switches, routers, servers, and other equipment on the company side of the company/customer demarcation point.

# COMCAST BUSINESS

## Certificate of Insurance



### CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)  
12/01/2014

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

<b>PRODUCER</b> MARSH USA INC. 1717 Arch Street Philadelphia, PA 19103-2797 Attn: Comcast.Certs@marsh.com Fax: 212-648-0360		<b>CONTACT NAME</b> PHONE (A/C No. Ext): E-MAIL ADDRESS: FAX (A/C No):	
05184-ALL-14-15		<b>INSURER(S) AFFORDING COVERAGE</b>	
<b>INSURED</b> COMCAST CORPORATION ONE COMCAST CENTER 1701 JOHN F. KENNEDY BLVD. PHILADELPHIA, PA 19103		NAIG # INSURER A : ACE American Insurance Company 22667 INSURER B : Indemnity Ins Co Of North America 43575 INSURER C : ACE Property And Casualty Ins Co 20699 INSURER D : INSURER E : INSURER F :	

**COVERAGES**      **CERTIFICATE NUMBER:** CLE-004015035-03      **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	GENERAL LIABILITY <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> SIR: \$100,000  GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PROJ <input type="checkbox"/> LOC		XSLG27340313	12/01/2014	12/01/2015	EACH OCCURRENCE \$ 4,900,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 4,900,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 4,900,000 GENERAL AGGREGATE \$ 25,000,000 PRODUCTS - COMP/OP AGG \$ 6,000,000
A	AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS		SAH06830602	12/01/2014	12/01/2015	COMBINED SINGLE LIMIT (Ea accident) \$ 5,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
C	<input checked="" type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE  DED    RETENTION \$		XOO G27636895	12/01/2014	12/01/2015	EACH OCCURRENCE \$ 10,000,000 AGGREGATE \$ 10,000,000
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)	Y/N	WLRC48140087 (AOS)	12/01/2014	12/01/2015	<input checked="" type="checkbox"/> WC STATUTORY LIMITS <input type="checkbox"/> OTHER
A		N/A	WLRC48140105 (CA, MA)	12/01/2014	12/01/2015	E.L. EACH ACCIDENT \$ 2,000,000
A			SCFC48140129 (WI)	12/01/2014	12/01/2015	E.L. DISEASE - EA EMPLOYEE \$ 2,000,000 E.L. DISEASE - POLICY LIMIT \$ 2,000,000
A	Excess Workers Compensation		WCUC48140130 (WA)	12/01/2014	12/01/2015	Ea Acc/Dis Employee/Dis Policy 2,000,000 SIR 5,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)  
EVIDENCE OF INSURANCE

<b>CERTIFICATE HOLDER</b> COMCAST BUSINESS COMMUNICATIONS, LLC ONE COMCAST CENTER 1701 JOHN F. KENNEDY BLVD. PHILADELPHIA, PA 19103	<b>CANCELLATION</b> SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.  AUTHORIZED REPRESENTATIVE of Marsh USA Inc. Manashi Mukherjee <i>Manashi Mukherjee</i>
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ACORD 25 (2010/05)      The ACORD name and logo are registered marks of ACORD

# COMCAST BUSINESS

## General Reference Information

Legal Name of Business: Comcast Business Communications LLC, "CBC"

Ownership: Corporation - Wholly-owned subsidiary of Comcast Corporation.

CBC has been in business in its present form for over nine (9) years.

### Corporate Officers

Terrence J. Connell	Daniel J. Carr	Michael D. Maloney
Senior Vice President	Vice President	Vice President

### Accounting & Disbursements

Denise DiCarlo  
Vice President, Controller

Employer ID # 23-1709202 for Comcast Cable Communications Management LLC

### Bank Contact

**Wells Fargo**  
101 N Independence Mall  
East  
Philadelphia PA 19106

**JP Morgan Chase Bank, N.A**  
14800 Frye Rd.  
Fort Worth, TX 76155-2732

### Supplier References

**Cisco**  
9850 Double R Boulevard,  
Park Center East  
Reno, NV 89521  
Attn: Rajshi Sidher – Credit  
Manager  
[rsidher@cisco.com](mailto:rsidher@cisco.com)

**General Instrument Corporation**  
*dba Motorola Mobility, Inc.*  
Broadband Communications Sector  
Communications Enterprise  
101 Tournament Drive  
Horsham, PA 19044  
Attn: Susan Bernard, Mgr. Accounts  
Receivable  
**Phone: (215) 323-1288**

### Dunn and Bradstreet

Comcast Business Corporation	05-715-6663
Comcast Cable Communication Division	78-767-2310
Comcast Business Communications, LLC	96-818-5491

# COMCAST BUSINESS

## Proposal Pricing

Comcast Note: Pricing as proposed above requires purchase of all sites **Terms and Conditions**— unless otherwise stated herein, this proposal is conditioned upon negotiation of mutually acceptable terms and conditions. **Proposal Pricing**—Pricing proposed herein is based upon the specific product/service mix and locations outlined in this proposal, are subject to Comcast standard terms and conditions for those products and services unless otherwise stated herein. Any changes or variations in the standard terms and conditions, the products/services, length of term, locations, and/or design described herein may result in different pricing. Prices quoted do not include applicable taxes, surcharges, or fees. In accordance with the tariffs or other applicable service agreement terms, Customer is responsible for payment of such charges.

# COMCAST BUSINESS

## Master Service Agreement

### Comcast Enterprise Services General Terms and Conditions

VERSION: 1.1

#### DEFINITIONS

**Affiliate:** Any entity that controls, is controlled by or is under common control with Comcast.

**Agreement, Enterprise Services Master Services Agreement or MSA:** Consists of the Enterprise Master Services Agreement Cover Page executed by the Customer and accepted by Comcast, these Enterprise Services General Terms and Conditions ("General Terms and Conditions"), the then current Product-Specific Attachment for each ordered Service ("PSA"), any written amendments to the Agreement executed by both Parties including any supplemental terms and conditions ("Amendment(s)"), and each Sales Order accepted by Comcast under the Agreement.

**Amendment(s):** Any written amendment to the Agreement, executed by both Parties, including any supplemental terms and conditions.

**Comcast:** The operating company affiliate or subsidiary of Comcast Cable Communications Management, LLC that provides the Services under the Enterprise Services Master Service Agreement. References to Comcast in the Limitation of Liability, Disclaimer of Warranties and Indemnification Articles shall also include its directors, officers, employees, agents, Affiliates, suppliers, licensors, successors, and assigns, as the case may be.

**Comcast Website or Website:** The Comcast website where the General Terms and Conditions, PSAs and other Comcast security and privacy policies applicable to the Agreement will be posted. The current URL for the Website is <http://business.comcast.com/terms-conditions/index.aspx>. Comcast may update the Website documents and/or URL from time to time.

**Comcast Equipment:** Any and all facilities, equipment or devices provided by Comcast or its authorized contractors at the Service Location(s) that are used to deliver any of the Services including, but not limited to, all terminals, wires, modems, lines, circuits, ports, routers, gateways, switches, channel service units, data service units, cabinets, and racks. Notwithstanding the above, inside telephone wiring within the Service Location, whether or not installed by Comcast, shall not be considered Comcast Equipment.

**Confidential Information:** All information regarding either Party's business which has been marked or is otherwise communicated as being "proprietary" or "confidential." or which reasonably should be known by the receiving party to be proprietary or confidential information. Without limiting the generality of the foregoing, Confidential Information shall include, even if not marked, the Agreement, all Licensed Software, promotional materials, proposals, quotes, rate information, discount information, subscriber information, network upgrade information and schedules, network

operation information (including without limitation information about outages and planned maintenance) and invoices, as well as the Parties' communications regarding such items.

**Customer:** The company, corporation, or other entity named on the Enterprise Services Master Service Agreement Cover Page and a Sales Order.

**Customer-Provided Equipment (CE):** Any and all facilities, equipment or devices supplied by Customer for use in connection with the Services.

**Demarcation Point:** The point of interconnection between the Comcast and Customer provided equipment located at a Service Location. In some cases the Demarcation Point shall be the User to Network Interface (UNI) port on Comcast Equipment at a Service Location.

**General Terms and Conditions:** These Enterprise Services General Terms and Conditions.

**Licensed Software:** Computer software or code provided by Comcast or required to use the Services, including without limitation, associated documentation, and all updates thereto.

**Network:** Consists of the Comcast Equipment, facilities, fiber optic cable associated with electronics and other equipment used to provide the Services.

**Party:** A reference to Comcast or the Customer; and in the plural, a reference to both companies.

**Product Specific Attachment(s) (PSA):** The additional terms and conditions applicable to Services ordered by Customer under the Agreement.

**Revenue Commitment:** A commitment by Customer to purchase a minimum volume of Service during an agreed term, as set forth in a Sales Order.

**Sales Order:** A request for Comcast to provide the Services to a Service Location(s) submitted by Customer to Comcast (a) on a then-current Comcast form designated for that purpose or (b) if available, through a Comcast electronic order processing system designated for that purpose.

**Service(s):** A service provided by Comcast pursuant to a Sales Order. All Services provided under the Agreement are for commercial use only. Services available under this Agreement are identified on the Website.

# COMCAST BUSINESS

**Service Commencement Date:** The date(s) on which Comcast first makes Service available for use by Customer. A single Sales Order containing multiple Service Locations or Services may have multiple Service Commencement Dates.

**Service Location(s):** The Customer location(s) where Comcast provides the Services, to the extent the Customer owns, leases, or otherwise controls such location(s).

**Service Term:** The duration of time (commencing on the Service Commencement Date) for which Services are ordered, as specified in a Sales Order.

**Tariff:** A federal or state Comcast tariff and the successor documents of general applicability that replace such tariff in the event of detariffing.

**Termination Charges:** Charges that may be imposed by Comcast if, prior to the end of the applicable Service Term (a) Comcast terminates Services for cause or (b) Customer terminates Services without cause. Termination Charges are as set forth in each PSA, and are in addition to any other rights and remedies under the Agreement.

## **ARTICLE 1. CHANGES TO THE AGREEMENT TERMS**

Comcast may change or modify the Agreement, and any related policies from time to time ("Revisions") by posting such Revisions to the Comcast Website. The Revisions are effective upon posting to the Website. Customer will receive notice of the Revisions in the next applicable monthly invoice. Customer shall have thirty (30) calendar days from the posting of such Revisions to provide Comcast with written notice that the Revisions adversely affect Customer's use of the Service(s). If after notice Comcast is able to verify such adverse affect but is unable to reasonably mitigate the Revision's impact on such Services, then Customer may terminate the impacted Service(s) without further obligation to Comcast beyond the termination date, including early termination charges, if any. This shall be Customer's sole and exclusive remedy.

## **ARTICLE 2. DELIVERY OF SERVICE**

**2.1 Orders.** Customer shall submit to Comcast a properly completed Sales Order to initiate Service to a Service Location(s). A Sales Order shall become binding on the Parties when (i) it is specifically accepted by Comcast either electronically or in writing, (ii) Comcast begins providing the Service described in the Sales Order or (iii) Comcast begins Custom Installation (as defined in Article 2.7) for delivery of the Services described in the Sales Order, whichever is earlier. When a Sales Order becomes effective it shall be deemed part of, and shall be subject to, the Agreement.

**2.2 Access.** In order to deliver certain Services to Customer, Comcast may require access, right-of-way, conduit, and/or common room space ("Access"), both within and/or outside each Service Location. Customer shall provide an adequate environmentally controlled space and such electricity as may be required for installation, operation, and maintenance of the Comcast Equipment used to provide the Services within the Service Location(s). Customer shall be responsible for securing, and maintaining on an

initial and ongoing basis during the applicable Service Term and/or Renewal Term, such Access within each Service Location unless Comcast has secured such access prior to this Agreement. In the event that Customer, fails to secure or maintain such Access within a particular Service Location, Comcast may cancel or terminate Service at such particular Service Location, without further liability, upon written notice to Customer. In such event, if Comcast has incurred any costs or expense in installing or preparing to install the Service that it otherwise would not have incurred, a charge equal to those costs and expenses shall apply to Customer's final invoice for that particular Service Location. If Comcast is unable to secure or maintain Access outside a particular Service Location, which Access is needed to provide Services to such Service Location, Customer or Comcast may cancel or terminate Service at such particular Service Location, without further liability beyond the termination date, upon a minimum thirty (30) days' prior written notice to the other party. In such event, if Comcast has incurred any costs or expense in installing or preparing to install the Service that it otherwise would not have incurred, Comcast shall be responsible for such costs or expenses. Any other failure on the part of Customer to be ready to receive Service, or any refusal on the part of Customer to receive Service, shall not relieve Customer of its obligation to pay charges for any Service that is otherwise available for use.

**2.3 Hazardous Materials.** If the presence of asbestos or other hazardous materials exists or is detected at a Service Location or within the building where the Service Location is located, Comcast may immediately stop providing Services until such a time as such materials are removed. Alternatively Customer may notify Comcast to install the applicable portion of the Service in areas of any such Service Location not containing such hazardous material. Any additional expense incurred by Comcast as a result of encountering hazardous materials, including but not limited to, any additional equipment shall be borne by Customer. Customer shall use reasonable efforts to maintain its property and Service Locations in a manner that preserves the integrity of the Services.

**2.4 Comcast Equipment.** At any time Comcast may remove or change Comcast Equipment in its sole discretion in connection with providing the Services. Customer shall not move, rearrange, disconnect, remove, attempt to repair, or otherwise tamper with any Comcast Equipment or permit others to do so, and shall not use the Comcast Equipment for any purpose other than that authorized by the Agreement. Comcast shall maintain Comcast Equipment in good operating condition during the term of this Agreement; provided, however, that such maintenance shall be at Comcast's expense only to the extent that it is related to and/or resulting from the ordinary and proper use of the Comcast Equipment. Customer is responsible for damage to, or loss of, Comcast Equipment caused by its acts or omissions, and its noncompliance with this Article, or by fire, theft or other casualty at the Service Location(s), unless caused by the gross negligence or willful misconduct of Comcast.

**2.5 Ownership, Impairment and Removal of Network.** The Network is and shall remain the property of Comcast regardless of whether installed within or upon the Service Location(s) and whether installed overhead, above, or underground and shall not be considered a fixture or an addition to the land or the Service Location(s) located thereon. Customer agrees that it shall take no action that directly or indirectly impairs Comcast's title to the

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Network, or any portion thereof, or exposes Comcast to any claim, lien, encumbrance, or legal process, except as otherwise agreed in writing by the Parties. Nothing in this Agreement shall preclude Comcast from using the Network for services provided to other Comcast customers. For a period of twelve (12) months following Comcast's discontinuance of Service to the Service Location(s), Comcast retains the right to remove the Network including, but not limited to, that portion of the Network that is located in the Service Location. To the extent Comcast removes such portion of the Network it shall be responsible for returning the Service Location(s) to its prior condition, reasonable wear and tear excepted.

**2.6 Customer Provided Equipment ("CE").** Comcast shall have no obligation to install, operate, or maintain CE. Customer shall have sole responsibility for providing maintenance, repair, operation and replacement of all CE, inside telephone wiring and other Customer equipment and facilities on the Customer's side of the Demarcation Point. Neither Comcast nor its employees, Affiliates, agents or contractors will be liable for any damage, loss, or destruction to CE, unless caused by the gross negligence or willful misconduct of Comcast. CE shall at all times be compatible with the Network as determined by Comcast in its sole discretion. In addition to any other service charges that may be imposed from time to time, Customer shall be responsible for the payment of service charges for visits by Comcast's employees or agents to a Service Location when the service difficulty or trouble report results from the use of CE or facilities provided by any party other than Comcast.

**2.7 Engineering Review.** Each Sales Order submitted by Customer may be subject to an engineering review. The engineering review will determine whether and to what extent the Network must be extended, built or upgraded ("Custom Installation") in order to provide the ordered Services at the requested Service Location(s). Comcast will provide Customer written notification in the event Service installation at any Service Location will require an additional non-recurring installation fee ("Custom Installation Fee"). Custom Installation Fees may also be referred to as Construction Charges on a Service Order or Invoice. Customer will have five (5) days from receipt of such notice to reject the Custom Installation Fee and terminate, without further liability, the Sales Order with respect to the affected Service Location(s). For certain Services, the Engineering Review will be conducted prior to Sales Order submission. In such case, Customer will have accepted the designated Custom Installation Fee upon submission of the applicable Sales Order.

**2.8 Service Acceptance.** Except as may otherwise be identified in the applicable PSA, the Service Commencement Date shall be the date Comcast completes installation and connection of the necessary facilities and equipment to provide the Service at a Service Location.

**2.9 Administrative Website.** Comcast may furnish Customer with one or more user identifications and/or passwords for use on the Administrative Website. Customer shall be responsible for the confidentiality and use of such user identifications and/or passwords and shall immediately notify Comcast if there has been an unauthorized release, use or other compromise of any user identification or password. In addition, Customer agrees that its authorized users shall keep confidential and not distribute any

information or other materials made available by the Administrative Website. Customer shall be solely responsible for all use of the Administrative Website, and Comcast shall be entitled to rely on all Customer uses of and submissions to the Administrative Website as authorized by Customer. Comcast shall not be liable for any loss, cost, expense or other liability arising out of any Customer use of the Administrative Website or any information on the Administrative Website. Comcast may change or discontinue the Administrative Website, or Customer's right to use the Administrative Website, at any time. Additional terms and policies may apply to Customer's use of the Administrative Website. These terms and policies will be posted on the site.

## **ARTICLE 3. BILLING AND PAYMENT**

**3.1 Charges.** Except as otherwise provided in the applicable PSA, Customer shall pay Comcast one hundred percent (100%) of the Custom Installation Fee prior to the installation of Service. Customer further agrees to pay all charges associated with the Services, as set forth or referenced in the applicable PSA, Sales Order(s) or invoice from Comcast. These charges may include, but are not limited to standard and custom non-recurring installation charges, monthly recurring service charges, usage charges including without limitation charges for the use of Comcast Equipment, per-call charges, pay-per-view charges, charges for service calls, maintenance and repair charges, and applicable federal, state, and local taxes, fees, surcharges and recoupments (however designated). Some Services such as measured and per-call charges, pay-per-view movies or events, and interactive television (as explained in the applicable PSA) may be invoiced after the Service has been provided to Customer. Except as otherwise indicated herein or in the applicable PSA(s) monthly recurring charges for Ethernet, Video and Internet Services that are identified on a Sales Order shall not increase during the Service Term. Except as otherwise indicated herein or in the Sales Order(s), Voice Service pricing, charges and fees can be found in the applicable PSA.

**3.2 Third-Party Charges.** Customer may incur charges from third party service providers that are separate and apart from, or based on the amounts charged by Comcast. These may include, without limitation, charges resulting from wireless services including roaming charges, accessing on-line services, calls to parties who charge for their telephone based services, purchasing or subscribing to other offerings via the Internet or interactive options on certain Video services, or otherwise. Customer agrees that all such charges, including all applicable taxes, are Customer's sole responsibility. In addition, Customer is solely responsible for protecting the security of credit card information provided to others in connection with such transactions.

**3.3 Payment of Bills.** Except as otherwise indicated herein or in a PSA, Comcast will invoice Customer in advance on a monthly basis for all monthly recurring charges and fees arising under the Agreement. All other charges will be billed monthly in arrears, including without limitation certain usage based charges and third party pass through fees. Payment is due upon presentation of an invoice. Payment will be considered timely made to Comcast if received within thirty (30) days after the invoice date. Any charges not paid to Comcast within such period will be considered past due. If a Service Commencement Date is not the first day of a billing

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period, Customer's first monthly invoice shall include any pro-rated charges for the Services, from the date of installation to the start of the next billing period. In certain cases, Comcast may agree to provide billing services on behalf of third parties, as the agent of the third party. Any such third-party charges shall be payable pursuant to any contract or other arrangement between the third party and Customer and/or Comcast. Comcast shall not be responsible for any dispute regarding these charges between Customer and such third party. Customer must address all such disputes directly with the third party.

**3.4 Partial Payment.** Partial payment of any bill will be applied to the Customer's outstanding charges in amounts and proportions solely determined by Comcast. No acceptance of partial payment(s) by Comcast shall constitute a waiver of any rights to collect the full balance owed under the Agreement.

**3.5 Credit Approval and Deposits.** Initial and ongoing delivery of Services may be subject to credit approval. Customer shall provide Comcast with credit information requested by Comcast. Customer authorizes Comcast to make inquiries and to receive information about Customer's credit history from others and to enter this information in Customer's records. Customer represents and warrants that all credit information that it provides to Comcast will be true and correct. Comcast, in its sole discretion, may deny the Services based upon an unsatisfactory credit history. Additionally, subject to applicable regulations, Comcast may require Customer to make a deposit (in an amount not to exceed an estimated two months charge for the Services) as a condition to Comcast's provision of the Services, or as a condition to Comcast's continuation of the Services. The deposit will not, unless explicitly required by law, bear interest and shall be held by Comcast as security for payment of Customer's charges. Comcast may apply the deposit to any delinquent Customer charges upon written notice to Customer. If Comcast uses any or all of the deposit to pay an account delinquency, Customer will replenish the deposit by that amount within five (5) days of its receipt of written notice from Comcast. If the provision of Service to Customer is terminated, or if Comcast determines in its sole discretion that such deposit is no longer necessary, then the amount of the deposit (plus any required deposit interest) will be credited to Customer's account or will be refunded to Customer, as determined by Comcast.

**3.6 Taxes and Fees.** Except to the extent Customer provides a valid tax exemption certificate prior to the delivery of Service, Customer shall be responsible for the payment of any and all applicable local, state, and federal taxes or fees (however designated). Customer also will be responsible to pay any Service fees, payment obligations and taxes that become applicable retroactively.

**3.7 Other Government-Related Costs and Fees.** Comcast reserves the right to invoice Customer for any fees or payment obligations in connection with the Services imposed by governmental or quasi-governmental bodies in connection with the sale, installation, use, or provision of the Services, including, without limitation, applicable franchise fees, right of way fees and universal service fund charges (if any), regardless of whether Comcast or its Affiliates pay the fees directly or are required by an order, rule, or regulation of a taxing jurisdiction to collect them from Customer.

Taxes and other government-related fees and surcharges may be changed with or without notice. In the event that any newly adopted law, rule, regulation or judgment increases Comcast's costs of providing Services, Customer shall pay Comcast's additional costs of providing Services under the new law, rule, regulation or judgment.

**3.8 Disputed Invoice.** If Customer disputes any portion of an invoice by the due date, Customer must pay fifty percent (50%) of the disputed charges, in addition to the undisputed portion of the invoice and submit a written claim, including all documentation substantiating Customer's claim, to Comcast for the disputed amount of the invoice by the invoice due date. The Parties shall negotiate in good faith to resolve any billing dispute. Comcast will refund/credit all valid disputes resolved in Customer's favor as of the date the disputed charges first appeared on the Customer's invoice.

**3.9 Past-Due Amounts.** Any payment not made when due will be subject to a late charge of 1.5% per month or the highest rate allowed by law on the unpaid invoice, whichever is lower. If Customer's account is delinquent, Comcast may refer the account to a collection agency or attorney that may pursue collection of the past due amount and/or any Comcast Equipment that Customer fails to return in accordance with the Agreement. If Comcast is required to use a collection agency or attorney to collect any amount owed by Customer or any unreturned Comcast Equipment, Customer agrees to pay all reasonable costs of collection or other action. The remedies set forth herein are in addition to and not in limitation of any other rights and remedies available to Comcast under the Agreement or at law or in equity.

**3.10 Rejected Payments.** Except to the extent otherwise prohibited by law, Customer will be assessed a service charge up to the full amount permitted under applicable law for any check or other instrument used to pay for the Services that has been rejected by the bank or other financial institution.

**3.11 Fraudulent Use of Services.** Customer is responsible for all charges attributable to Customer with respect to the Service(s), even if incurred as the result of fraudulent or unauthorized use of the Service. Comcast may, but is not obligated to, detect or report unauthorized or fraudulent use of Services to Customer. Comcast reserves the right to restrict, suspend or discontinue providing any Service in the event of fraudulent use of Customer's Service.

## **ARTICLE 4. TERM: REVENUE COMMITMENT**

**4.1 Agreement Term.** Upon execution of the Agreement, Customer shall be allowed to submit Sales Orders to Comcast during the term referenced on the Master Service Agreement Cover Page ("MSA Term"). After the expiration of the initial MSA Term, Comcast may continue to accept Sales Orders from Customer under the Agreement, or require the Parties to execute a new agreement. This Agreement shall continue in effect until the expiration or termination date of the last Sales Order entered under the Agreement, unless terminated earlier in accordance with the Agreement.



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**4.2 Sales Order Term/Revenue Commitment.** The applicable Service Term and Revenue Commitment (if any) shall be set forth in the Sales Order. Unless otherwise stated in these terms and conditions or the applicable PSA, if a Sales Order does not specify a term of service, the Service Term shall be one (1) year from the Service Commencement Date. In the event Customer fails to satisfy a Revenue Commitment, Customer will be billed a shortfall charge pursuant to the terms of the applicable PSA.

**4.3 Sales Order Renewal.** Upon the expiration of the Service Term, and unless otherwise agreed to by the Parties in the Sales Order, each Sales Order shall automatically renew for successive periods of one (1) year each ("Renewal Term(s)"), unless otherwise stated in these terms and conditions or prior notice of non-renewal is delivered by either Party to the other at least thirty (30) days before the expiration of the Service Term or the then current Renewal Term. Effective at any time after the end of the Service Term and from time to time thereafter, Comcast may, modify the charges for Ethernet, Internet and/or Video Services subject to thirty (30) days prior written notice to Customer. Customer will have thirty (30) days from receipt of such notice to cancel the applicable Service without further liability. Should Customer fail to cancel within this timeframe, Customer will be deemed to have accepted the modified Service pricing.

## **ARTICLE 5. TERMINATION WITHOUT FAULT; DEFAULT**

**5.1 Termination for Convenience.** Notwithstanding any other term or provision in this Agreement, Customer shall have the right, in its sole discretion, to terminate any or all Sales Order(s) at any time during the Service Term(s), upon thirty (30) days prior written notice to Comcast and subject to payment to Comcast of all outstanding amounts due for the Services, any and all applicable Termination Charges, and the return of all applicable Comcast Equipment. Comcast may terminate the Agreement if Customer does not take any Service under a Sales Order for twelve (12) consecutive months or longer.

**5.2 Termination for Cause.** If either Party breaches any material term of the Agreement, other than a payment term, and the breach continues un-remedied for thirty (30) days after written notice of default, the other Party may terminate for cause any Sales Order materially affected by the breach. If Customer is in breach of a payment obligation (including failure to pay a required deposit) and fails to make payment in full within ten (10) days after receipt of written notice of default, Comcast may, at its option, terminate the Agreement, terminate the affected Sales Orders, suspend Service under the affected Sales Orders, and/or require a deposit, advance payment, or other satisfactory assurances in connection with any or all Sales Orders as a condition of continuing to provide Service; except that Comcast will not take any such action as a result of Customer's non-payment of a charge subject to a timely billing dispute, unless Comcast has reviewed the dispute and determined in good faith that the charge is correct. A Sales Order may be terminated by either Party immediately upon written notice if the other Party has become insolvent or involved in liquidation or termination of its business, or adjudicated bankrupt, or been involved in an assignment for the benefit of its creditors. Termination by either Party of a Sales Order does not waive any other rights or remedies that it may have under this Agreement. The

non-defaulting Party shall be entitled to all available legal and equitable remedies for such breach.

## **5.3 Effect of Expiration/Termination of a Sales Order.**

Upon the expiration or termination of a Sales Order for any reason:

- A.** Comcast shall disconnect the applicable Service;
- B.** Comcast may delete all applicable data, files, electronic messages, or other information stored on Comcast's servers or systems;
- C.** If Customer has terminated the Sales Order prior to the expiration of the Service Term for convenience, or if Comcast has terminated the Sales Order prior to the expiration of the Service Term as a result of material breach by Customer, Comcast may assess and collect from Customer applicable Termination Charges (if any);
- D.** Customer shall, permit Comcast to retrieve from the applicable Service Location any and all Comcast Equipment. If Customer fails to permit such retrieval or if the retrieved Comcast Equipment has been damaged and/or destroyed other than by Comcast or its agents, normal wear and tear excepted, Comcast may invoice Customer for the manufacturer's list price of the relevant Comcast Equipment, or in the event of minor damage to the retrieved Comcast Equipment, the cost of repair, which amounts shall be immediately due and payable; and
- E.** Customer's right to use applicable Licensed Software shall automatically terminate, and Customer shall be obligated to return all Licensed Software to Comcast.

**5.4 Resumption of Service.** If a Service has been discontinued by Comcast for cause and Customer requests that the Service be restored, Comcast shall have the sole and absolute discretion to restore such Service. At Comcast's option, deposits, advanced payments, nonrecurring charges, and/or an extended Service Term may apply to restoration of Service.

**5.5 Regulatory and Legal Changes.** The Parties acknowledge that the respective rights and obligations of each Party as set forth in this Agreement upon its execution are based on applicable law and regulations as they exist on the date of execution of this Agreement. The Parties agree that in the event of any subsequent decision by a legislative, regulatory or judicial body, including any regulatory or judicial order, rule, regulation, decision in any arbitration or other dispute resolution or other legal or regulatory action that materially affects the provisions or ability to provide Services on economic terms of the Agreement, Comcast may, by providing written notice to the Customer, require that the affected provisions of the Agreement be renegotiated in good faith. If Customer refuses to enter such renegotiations, or the Parties can't reach resolution on new Agreement terms, Comcast may, in its sole discretion, terminate this Agreement, in whole or in part, upon sixty (60) days written notice to Customer.

## **ARTICLE 6. LIMITATION OF LIABILITY; DISCLAIMER OF WARRANTIES; WARNINGS**

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## 6.1 Limitation of Liability.

A, THE AGGREGATE LIABILITY OF COMCAST FOR ANY AND ALL LOSSES, DAMAGES AND CAUSES ARISING OUT OF THE AGREEMENT, INCLUDING, BUT NOT LIMITED TO, THE PERFORMANCE OF SERVICE, AND NOT OTHERWISE LIMITED HEREUNDER, WHETHER IN CONTRACT, TORT, OR OTHERWISE, SHALL NOT EXCEED DIRECT DAMAGES EQUAL TO THE SUM TOTAL OF PAYMENTS MADE BY CUSTOMER TO COMCAST DURING THE THREE (3) MONTHS IMMEDIATELY PRECEDING THE EVENT FOR WHICH DAMAGES ARE CLAIMED. THIS LIMITATION SHALL NOT APPLY TO COMCAST'S INDEMNIFICATION OBLIGATIONS AND CLAIMS FOR DAMAGE TO PROPERTY AND/OR PERSONAL INJURIES (INCLUDING DEATH) ARISING OUT OF THE GROSS NEGLIGENCE OR WILLFUL MISCONDUCT OF COMCAST WHILE ON THE CUSTOMER SERVICE LOCATION.

B. NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INCIDENTAL, INDIRECT, SPECIAL, COVER, PUNITIVE OR CONSEQUENTIAL DAMAGES, WHETHER OR NOT FORESEEABLE, OF ANY KIND INCLUDING BUT NOT LIMITED TO ANY LOSS REVENUE, LOSS OF USE, LOSS OF BUSINESS, OR LOSS OF PROFIT WHETHER SUCH ALLEGED LIABILITY ARISES IN CONTRACT OR TORT HOWEVER, THAT NOTHING HEREIN IS INTENDED TO LIMIT CUSTOMER'S LIABILITY FOR AMOUNTS OWED FOR THE SERVICES, FOR ANY EQUIPMENT OR SOFTWARE PROVIDED BY COMCAST OR FOR EARLY TERMINATION CHARGES.

## 6.2 Disclaimer of Warranties.

A. Services shall be provided pursuant to the terms and conditions in the applicable PSA and Service Level Agreement, and are in lieu of all other warranties, express, implied or statutory, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose, title, and non-infringement. To the maximum extent allowed by law, Comcast expressly disclaims all such express, implied and statutory warranties.

B. Without limiting the generality of the foregoing, and except as otherwise identified in a PSA or Service Level Agreement, Comcast does not warrant that the Services, Comcast Equipment, or Licensed Software will be uninterrupted, error-free, or free of latency or delay, or that the Services, Comcast Equipment, or Licensed Software will meet customer's requirements, or that the Services, Comcast Equipment, or Licensed Software will prevent unauthorized access by third parties.

C. In no event shall Comcast, be liable for any loss, damage or claim arising out of or related to: (i) stored, transmitted, or recorded data, files, or software; (ii) any act or omission of Customer, its users or third parties; (iii) interoperability, interaction or interconnection of the Services with applications, equipment, services or networks provided by Customer or third parties; or (iv) loss or destruction of any Customer hardware, software, files or data resulting from any virus or other harmful feature or from any attempt to remove it. Customer is advised to back up all data, files and

software prior to the installation of Service and at regular intervals thereafter.

6.3 Disruption of Service. Notwithstanding the performance standards identified in a PSA, the Services are not fail-safe and are not designed or intended for use in situations requiring fail-safe performance or in which an error or interruption in the Services could lead to severe injury to business, persons, property or environment ("High Risk Activities"). These High Risk Activities may include, without limitation, vital business or personal communications, or activities where absolutely accurate data or information is required.

6.4 Customer's sole and exclusive remedies are expressly set forth in the Agreement. Certain of the above exclusions may not apply if the state in which a Service is provided does not allow the exclusion or limitation of implied warranties or does not allow the limitation or exclusion of incidental or consequential damages. In those states, the liability of Comcast is limited to the maximum extent permitted by law.

## ARTICLE 7. INDEMNIFICATION

7.1 Comcast's Indemnification Obligations. Comcast shall indemnify, defend, and hold harmless Customer and its parent company, affiliates, employees, directors, officers, and agents from and against all claims, demands, actions, causes of actions, damages, liabilities, losses, and expenses (including reasonable attorneys' fees) ("Claims") incurred as a result of: infringement of U.S. patent or copyright relating to the Comcast Equipment or Comcast Licensed Software hereunder; damage to tangible personal property or real property, and personal injuries (including death) arising out of the gross negligence or willful misconduct of Comcast while working on the Customer Service Location.

7.2 Customer's Indemnification Obligations. Customer shall indemnify, defend, and hold harmless Comcast from any and all Claims arising on account of or in connection with Customer's use or sharing of the Service provided under the Agreement, including with respect to: libel, slander, infringement of copyright, or unauthorized use of trademark, trade name, or service mark arising out of communications via the Service; for patent infringement arising from Customer's combining or connection of CE to use the Service; for damage arising out of the gross negligence or willful misconduct of Customer with respect to users of the Service.

7.3 Indemnification Procedures. The Indemnifying Party agrees to defend the Indemnified Party for any loss, injury, liability, claim or demand ("Actions") that is the subject of this Article 7. The Indemnified Party agrees to notify the Indemnifying Party promptly, in writing, of any Actions, threatened or actual, and to cooperate in every reasonable way to facilitate the defense or settlement of such Actions. The Indemnifying Party shall assume the defense of any Action with counsel reasonably satisfactory to the Indemnified Party. The Indemnified Party may employ its own counsel in any such case, and shall pay such counsel's fees and expenses. The Indemnifying Party shall have the right to settle any claim for which indemnification is available; provided, however, that to the extent that such settlement requires the Indemnified Party to take or refrain from taking any action or purports to obligate the Indemnified Party,

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then the Indemnifying Party shall not settle such claim without the prior written consent of the Indemnified Party, which consent shall not be unreasonably withheld, conditioned or delayed.

## ARTICLE 8. SOFTWARE & SERVICES

**8.1 License.** If and to the extent that Customer requires the use of Licensed Software in order to use the Service supplied under any Sales Order, Customer shall have a personal, nonexclusive, nontransferable, and limited license to use such Licensed Software in object code only and solely to the extent necessary to use the applicable Service during the corresponding Service Term. All Licensed Software provided to Customer, and each revised version thereof, is licensed (not sold) to Customer by Comcast only for use in conjunction with the Service. Customer may not claim title to, or an ownership interest in, any Licensed Software (or any derivations or improvements thereto), and Customer shall execute any documentation reasonably required by Comcast, including, without limitation, end-user license agreements for the Licensed Software. Comcast and its suppliers shall retain ownership of the Licensed Software, and no rights are granted to Customer other than a license to use the Licensed Software under the terms expressly set forth in this Agreement.

**8.2 Restrictions.** Customer agrees that it shall not: (i) copy the Licensed Software (or any upgrades thereto or related written materials) except for emergency back-up purposes or as permitted by the express written consent of Comcast; (ii) reverse engineer, decompile, or disassemble the Licensed Software; (iii) sell, lease, license, or sublicense the Licensed Software; or (iv) create, write, or develop any derivative software or any other software program based on the Licensed Software.

**8.3 Updates.** Customer acknowledges that the use of Service may periodically require updates and/or changes to certain Licensed Software resident in the Comcast Equipment or CE. If Comcast has agreed to provide updates and changes, such updates and changes may be performed remotely or on-site by Comcast, at Comcast's sole option. Customer hereby consents to, and shall provide free access for, such updates deemed reasonably necessary by Comcast. If Customer fails to agree to such updates, Comcast will be excused from the applicable Service Level Agreement and other performance credits, and any and all liability and indemnification obligations regarding the applicable Service.

**8.4 Export Law and Regulation.** Customer acknowledges that any products, software, and technical information (including, but not limited to, services and training) provided pursuant to the Agreement may be subject to U.S. export laws and regulations. Customer agrees that it will not use, distribute, transfer, or transmit the products, software, or technical information (even if incorporated into other products) except in compliance with U.S. export regulations. If requested by Comcast, Customer also agrees to sign written assurances and other export-related documents as may be required for Comcast to comply with U.S. export regulations.

**8.5 Ownership of Telephone Numbers and Addresses.** Customer acknowledges that use of certain Services does not give it any ownership or other rights in any telephone number or Internet/on-line addresses provided, including but not limited to

Internet Protocol ("IP") addresses, e-mail addresses and web addresses.

**8.6 Intellectual Property Rights in the Services.** Title and intellectual property rights to the Services are owned by Comcast, its agents, suppliers or affiliates or their licensors or otherwise by the owners of such material. The copying, redistribution, bundling or publication of the Services, in whole or in part, without express prior written consent from Comcast or other owner of such material, is prohibited.

## ARTICLE 9. CONFIDENTIAL INFORMATION AND PRIVACY

**9.1 Disclosure and Use.** All Confidential Information disclosed by either Party shall be kept by the receiving party in strict confidence and shall not be disclosed to any third party without the disclosing party's express written consent. Notwithstanding the foregoing, such information may be disclosed (i) to the receiving party's employees, affiliates, and agents who have a need to know for the purpose of performing this Agreement, using the Services, rendering the Services, and marketing related products and services (provided that in all cases the receiving party shall take appropriate measures prior to disclosure to its employees, affiliates, and agents to assure against unauthorized use or disclosure); or (ii) as otherwise authorized by this Agreement. Each Party agrees to treat all Confidential Information of the other in the same manner as it treats its own proprietary information, but in no case using a degree of care less than a reasonable degree of care.

**9.2 Exceptions.** Notwithstanding the foregoing, each Party's confidentiality obligations hereunder shall not apply to information that: (i) is already known to the receiving party without a pre-existing restriction as to disclosure; (ii) is or becomes publicly available without fault of the receiving party; (iii) is rightfully obtained by the receiving party from a third party without restriction as to disclosure, or is approved for release by written authorization of the disclosing party; (iv) is developed independently by the receiving party without use of the disclosing party's Confidential Information; or (v) is required to be disclosed by law or regulation.

**9.3 Publicity.** The Agreement provides no right to use any Party's or its affiliates' trademarks, service marks, or trade names, or to otherwise refer to the other Party in any marketing, promotional, or advertising materials or activities. Neither Party shall issue any publication or press release relating to, or otherwise disclose the existence of, the terms and conditions of any contractual relationship between Comcast and Customer, except as permitted by the Agreement or otherwise consented to in writing by the other Party. Notwithstanding the foregoing, Comcast may include Customer's name on Comcast's customer lists together with a description of Services purchased (financial terms not to be disclosed). If Customer wishes to remove Customer's name from such list or to limit the foregoing use of Customer's name, Customer may contact Comcast as set forth in Article 11.3 of these General Terms and Conditions and Comcast will effect such removal.

**9.4 Passwords.** Comcast may furnish Customer with user identifications and passwords for use in conjunction with certain Services, including, without limitation, for access to certain non-public Comcast website materials. Customer understands and

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agrees that such information shall be subject to Comcast's access policies and procedures located on Comcast's Web Site.

**9.5 Remedies.** Notwithstanding any other Article of this Agreement, the non-breaching Party shall be entitled to seek equitable relief to protect its interests pursuant to this Article 9, including, but not limited to, injunctive relief.

**9.6 Monitoring of Services.** Except as otherwise expressly set forth in a PSA, Comcast assumes no obligation to pre-screen or monitor Customer's use of the Service, including without limitation postings and/or transmission. However, Customer acknowledges and agrees that Comcast and its agents shall have the right to pre-screen and monitor such use from time to time and to use and disclose such results to the extent necessary to operate the Service properly, to ensure compliance with applicable use policies, to protect the rights and/or property of Comcast, or in emergencies when physical safety is at issue, and that Comcast may disclose the same to the extent necessary to satisfy any law, regulation, or governmental request. Comcast shall have no liability or responsibility for content received or distributed by Customer or its users through the Service, and Customer shall indemnify, defend, and hold Comcast and its directors, officers, employees, agents, subsidiaries, affiliates, successors, and assigns harmless from any and all claims, damages, and expenses whatsoever (including reasonable attorneys' fees) arising from such content attributable to Customer or its users.

**9.7 Survival of Confidentiality Obligations.** The obligations of confidentiality and limitation of use described in this Article 9 shall survive the expiration and termination of the Agreement for a period of two (2) years (or such longer period as may be required by law).

## **ARTICLE 10. USE OF SERVICE; USE AND PRIVACY POLICIES**

**10.1 Prohibited Uses and Comcast Use Policies.** Customer is prohibited from using, or permitting the use of, any Service (i) for any purpose in violation of any law, rule, regulation, or policy of any government authority; (ii) in violation of any Use Policy (as defined below); (iii) for any use as to which Customer has not obtained all required government approvals, authorizations, licenses, consents, and permits; or (iv) to interfere unreasonably with the use of Comcast service by others or the operation of the Network. Customer is responsible for assuring that any and all of its users comply with the provisions of the Agreement. Comcast reserves the right to act immediately and without notice to terminate or suspend the Services and/or to remove from the Services any information transmitted by or to Customer or users, if Comcast determines that such use is prohibited as identified herein, or information does not conform with the requirements set or Comcast reasonably believes that such use or information may violate any laws, regulations, or written and electronic instructions for use. Furthermore, to the extent applicable, Services shall be subject to Comcast's acceptable use policies ("Use Policies") that may limit use. The Use Policies and other security policies concerning the Services are posted on the Website, and are incorporated into this Agreement by reference. Comcast may update the Use Policies from time to time, and such updates shall be deemed effective immediately upon posting, with or without actual notice to Customer. Comcast's action or inaction in

enforcing acceptable use shall not constitute review or approval of Customer's or any other users' use or information.

**10.2 Privacy Policy.** In addition to the provisions of Article 9, Comcast's commercial privacy policy applies to Comcast's handling of Customer confidential information. Comcast's privacy policy is available on the Website.

**10.3 Privacy Note Regarding Information Provided to Third Parties.** Comcast is not responsible for any information provided by Customer to third parties. Such information is not subject to the privacy provisions of this Agreement. Customer assumes all privacy and other risks associated with providing personally identifiable information to third parties via the Services.

**10.4 Prohibition on Resale.** Customer may not sell, resell, sublease, assign, license, sublicense, share, provide, or otherwise utilize in conjunction with a third party (including, without limitation, in any joint venture or as part of any outsourcing activity) the Services or any component thereof.

**10.5 Violation.** Any breach of this Article 10 shall be deemed a material breach of this Agreement. In the event of such material breach, Comcast shall have the right to restrict, suspend, or terminate immediately any or all Sales Orders, without liability on the part of Comcast, and then to notify Customer of the action that Comcast has taken and the reason for such action, in addition to any and all other rights and remedies under this Agreement.

## **ARTICLE 11. MISCELLANEOUS TERMS**

**11.1 Force Majeure.** Neither Party (and in the case of Comcast, Comcast affiliates and subsidiaries) shall be liable to the other Party for any delay, failure in performance, loss, or damage to the extent caused by force majeure conditions such as acts of God, fire, explosion, power blackout, cable cut, acts of regulatory or governmental agencies, unavailability of right-of-way, unavailability of right-of-way or materials, or other causes beyond the Party's reasonable control, except that Customer's obligation to pay for Services provided under the Agreement shall not be excused. Changes in economic, business or competitive condition shall not be considered force majeure events.

**11.2 Assignment or Transfer.** Customer shall not assign any right, obligation or duty, in whole or in part, nor of any other interest hereunder, without the prior written consent of the other Party, which shall not be unreasonably withheld. All obligations and duties of either Party under this Agreement shall be binding on all successors in interest and assigns of such Party. Nothing herein is intended to limit Comcast's use of third-party consultants and contractors to perform Services under a Sales Order.

**11.3 Notices.** Any notice sent pursuant to the Agreement shall be deemed given and effective when sent by facsimile (confirmed by first-class mail), or when delivered by overnight express or other express delivery service, in each case as follows: (i) with respect to Customer, to the address set forth on any Sales Order; or (ii) with respect to Comcast, to: Vice President/Enterprise Sales, One Comcast Center, 1701 JFK Blvd., Philadelphia, PA 19103, with a copy to Cable Law Department, One Comcast Center, 50<sup>th</sup> Floor,

# COMCAST BUSINESS

1701 JFK Blvd., Philadelphia, PA 19103. Each Party shall notify the other Party in writing of any changes in its address listed on any Sales Order.

**11.4 Entire Understanding.** The Agreement, together with any applicable Tariffs, constitutes the entire understanding of the Parties related to the subject matter hereof. The Agreement supersedes all prior agreements, proposals, representations, statements, or understandings, whether written or oral, concerning the Services or the Parties' rights or obligations relating to Services. Any prior representations, promises, inducements, or statements of intent regarding the Services that are not embodied in the Agreement are of no effect. No subsequent agreement among the Parties concerning Service shall be effective or binding unless it is made in writing by authorized representatives of the Parties. Terms or conditions contained in any Sales Order, or restrictive endorsements or other statements on any form of payment, shall be void and of no force or effect.

**11.5 Tariffs.** Notwithstanding anything to the contrary in the Agreement, Comcast may elect or be required to file with regulatory agencies tariffs for certain Services. In such event, the terms set forth in the Agreement may, under applicable law, be superseded by the terms and conditions of the Tariffs. Without limiting the generality of the foregoing, in the event of any inconsistency with respect to rates, the rates and other terms set forth in the applicable Sales Order shall be treated as individual case based arrangements to the maximum extent permitted by law, and Comcast shall take such steps as are required by law to make the rates and other terms enforceable. If Comcast voluntarily or involuntarily cancels or withdraws a Tariff under which a Service is provided to Customer, the Service will thereafter be provided pursuant to the Agreement and the terms and conditions contained in the Tariff immediately prior to its cancellation or withdrawal. In the event that Comcast is required by a governmental authority to modify a Tariff under which Service is provided to Customer in a manner that is material and adverse to either Party, the affected Party may terminate the applicable Sales Order upon a minimum thirty (30) days' prior written notice to the other Party, without further liability.

**11.6 Construction.** In the event that any portion of the Agreement is held to be invalid or unenforceable, the Parties shall replace the invalid or unenforceable portion with another provision that, as nearly as possible, reflects the original intention of the Parties, and the remainder of the Agreement shall remain in full force and effect.

**11.7 Survival.** The rights and obligations of either Party that by their nature would continue beyond the expiration or termination of a Sales Order shall survive termination or expiration of the Sales Order.

**11.8 Choice of Law.** The domestic law of the state in which the Service is provided shall govern the construction, interpretation, and performance of this Agreement, except to the extent superseded by federal law.

**11.9 No Third Party Beneficiaries.** This Agreement does not expressly or implicitly provide any third party (including users) with any remedy, claim, liability, reimbursement, cause of action, or other right or privilege.

**11.10 Parties' Authority to Contract.** The persons whose signatures appear below are duly authorized to enter into the Agreement on behalf of the Parties name therein.

**11.11 No Waiver; Etc.** No failure by either Party to enforce any rights hereunder shall constitute a waiver of such right(s). This Agreement may be executed in counterpart copies.

**11.12 Independent Contractors.** The Parties to this Agreement are independent contractors. Neither Party is an agent, representative, or partner of the other Party. Neither Party shall have any right, power, or authority to enter into any agreement for, or on behalf of, or incur any obligation or liability of, or to otherwise bind, the other Party. This Agreement shall not be interpreted or construed to create an association, agency, joint venture, or partnership between the Parties or to impose any liability attributable to such a relationship upon either Party.

**11.13 Article Headings.** The article headings used herein are for reference only and shall not limit or control any term or provision of this Agreement or the interpretation or construction thereof.

**11.14 Compliance with Laws.** Each of the Parties agrees to comply with all applicable local, state and federal laws and regulations and ordinances in the performance of its respective obligations under this Agreement.

# COMCAST BUSINESS

## Comcast Account Team

### Commercial Matters

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### Technical Matters

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**COMCAST ENTERPRISE SERVICES  
PRODUCT-SPECIFIC ATTACHMENT  
ETHERNET TRANSPORT SERVICES**

**ATTACHMENT IDENTIFIER: Ethernet Transport, Version 1.5**

The following additional terms and conditions are applicable to Sales Orders for Comcast's Ethernet Transport Services:

**DEFINITIONS**

Capitalized terms not otherwise defined herein shall have the meaning ascribed to them in the General Terms and Conditions.

**"Estimated Availability Date"** means the target date for delivery of Service.

**"Interconnection Facilities"** means transmission capacity provided by Comcast, Customer or a third-party supplier to extend the Comcast Equipment from a Comcast terminal to any other location (e.g., a local loop provided by a local exchange company or other communications company).

**"Off-Net"** means geographical locations that are outside of Comcast's service area and/or geographical locations that are within Comcast's service area generally, but are not readily accessible by Comcast Network facilities. All Off-Net Services are provided by third-party service providers.

**"On-Net"** means geographical locations where Comcast currently provides Services through its Comcast Network. On-Net Services may be provisioned over a fiber optic network, or via a hybrid fiber coax network ("On-Net HFC"), as available through Comcast.

**"Services"** means Ethernet Transport Services.

**ARTICLE 1. SERVICES**

This attachment shall apply to Ethernet Transport Services. A further description of these Services is set forth in Schedule A-1 hereto which is incorporated herein by reference.

**ARTICLE 2. PROVIDER**

On-Net Service shall be provided by Comcast Business Communications, LLC.

On-Net Service provided over the On-Net HFC and Off-Net Services are available in a number of Comcast markets. For information on service availability, call 866-429-0152.

**ARTICLE 3. REGULATORY APPROVAL; TRAFFIC MIX**

Comcast's pricing for Service may be subject to FCC, public service commission or other regulatory approval. Further, Customer represents that its use of Service hereunder will be jurisdictionally interstate. Customer agrees to indemnify and hold Comcast harmless from any claims by third parties resulting from or arising out of Customer's failure to properly represent or certify the jurisdictional nature of its use of Service.

#### **ARTICLE 4. CUSTOM INSTALLATION FEE**

Once Comcast accepts a Sales Order for Service, Comcast will invoice Customer for all Custom Installation Fee(s). Customer will pay the Custom Installation Fee(s) within thirty (30) days of the invoice date unless a payment schedule is specified in the applicable Service Order.

#### **ARTICLE 5. PROVISIONING INTERVAL**

Following its acceptance of a Sales Order, Comcast shall notify Customer of the Estimated Availability Date applicable to that Sales Order. Comcast shall use commercially reasonable efforts to provision the Service on or before the Estimated Availability Date; provided, however, that Comcast's failure to provision by said date shall not constitute a breach of the Agreement.

#### **ARTICLE 6. SERVICE COMMENCEMENT DATE**

Comcast shall inform Customer when Service is available and performing in accordance with the "Performance Standards" set forth in Schedule A-1 hereto ("Availability Notification"). Charges for Service shall begin to accrue as of the Service Commencement Date. The Service Commencement Date shall be earliest of: (A) the date on which Customer confirms receipt of and concurrence with the Availability Notification; (B) five (5) business days following the date of the Availability Notification, if Customer fails to notify Comcast that the Service does not comply materially with the specifications set forth in Schedule A-1 hereto; or (C) the date on which Customer first uses the Service.

#### **ARTICLE 7. TERMINATION CHARGES; PORTABILITY; UPGRADES**

**7.1** The charges set forth or referenced in each Sales Order have been extended to Customer in reliance on the Service Term set forth therein. To the extent that a Service Term has not been expressly set forth in a Sales Order, the minimum Service Term for Services is twelve (12) months.

##### **7.2 Termination Charges for On-Net Services.**

**A.** In the event On-Net Service is terminated following Comcast's acceptance of the applicable Sales Order but prior to the Service Commencement Date, Customer shall pay Termination Charges equal to the costs and expenses incurred by Comcast in installing or preparing to install the On-Net Service plus twenty percent (20%).

**B.** In the event that On-Net Service is terminated on or following the Service Commencement Date but prior to the end of the applicable Service Term, Customer shall pay Termination Charges equal to a percentage of the monthly recurring charges remaining for the unexpired portion of the then-current Service Term, calculated as follows:

- i. 100% of the monthly recurring charges with respect to months 1-12 of the Service Term; plus
- ii. 80% of the monthly recurring charges with respect to months 13-24 of the Service Term; plus
- iii. 65% of the monthly recurring charges with respect to months 25 through the end of the Service Term; plus
- iv. 100% of any remaining, unpaid Custom Installation Fees.

Termination Charges shall be immediately due and payable upon cancellation or termination and shall be in addition to any and all accrued and unpaid charges for the Service rendered by Comcast through the date of cancellation or termination.



**C. Termination Charges for Off-Net Services.** In the event Customer terminates Off-Net Service following Comcast's acceptance of the applicable Sales Order but prior to the end of the applicable Service Term, Customer shall pay Termination Charges equal to 100% of the monthly recurring charges remaining through the end of the Service Term plus 100% of any remaining, unpaid Custom Installation Fees. Customer shall, pursuant to Article 3.2 of the General Terms and Conditions, also pay any third-party charges, incurred by Comcast as a result of the early termination of service by the Customer.

**7.3 Exclusions.** Termination Charges shall not apply to Service terminated by Customer (a) as a result of Comcast's failure to provision Service within the intervals specified in Article 5 of this attachment or (b) as a result of Comcast's material and uncured breach in accordance with Article 5.2 of the General Terms and Conditions.

**7.4 Portability.** Customer may terminate an existing On-Net Service (an "Existing Service") and turn up a replacement On-Net Service (i.e., having different termination points on Comcast's network) (a "Replacement Service") without incurring Termination Charges with respect to the Existing Service, provided that (a) the Replacement Service must have a Service Term equal to or greater than the remaining Service Term of the Existing Service; (b) the Replacement Service must have monthly recurring charges equal to or greater than the monthly recurring charges for the Existing Service; (c) Customer submits a Sales Order to Comcast for the Replacement Service within ninety (90) days after termination of the Existing Service and that order is accepted by Comcast; (d) Customer reimburses Comcast for any and all installation charges that were waived with respect to the Existing Service; and (e) Customer pays the actual costs incurred by Comcast in installing and provisioning the Replacement Service.

**7.5 Upgrades.** Customer may upgrade the speed or capacity of an Existing Service without incurring Termination Charges, provided that (A) the upgraded Service (the "Upgraded Service") must assume the remaining Service Term of the Existing Service; (B) the Upgraded Service must have the same points of termination on Comcast's network as the Existing Service; (C) Customer submits a Sales Order to Comcast for the Upgraded Service and that order is accepted by Comcast; (D) Customer pays Comcast's applicable nonrecurring charges for the upgrade; and (E) Customer agrees to pay the applicable monthly recurring charges for the Upgraded Service commencing with the upgrade. Upgrades to Off-Net Services are subject to the applicable third party service provider rules and availability. Comcast has no obligation to upgrade Customer's Off-Net Service.

#### **ARTICLE 8. ADDITIONAL INFORMATION**

As necessary for the interconnection of the Service with services provided by others, Comcast may request (as applicable), and Customer will provide to Comcast, circuit facility assignment information, firm order commitment information, and design layout records necessary to enable Comcast to make the necessary cross-connection between the Service and Customer's other service provider(s). Comcast may charge Customer nonrecurring and monthly recurring cross-connect charges to make such connections.

#### **ARTICLE 9. TECHNICAL SPECIFICATIONS AND PERFORMANCE STANDARDS; SERVICE LEVEL AGREEMENT**

The technical specifications and performance standards applicable to the Service are set forth in Schedule A-1 hereto. The service level agreement applicable to the Service is set forth in a Schedule A-2 hereto.

**COMCAST ENTERPRISE SERVICES  
PRODUCT-SPECIFIC ATTACHMENT  
ETHERNET TRANSPORT SERVICES**

**SCHEDULE A-1  
SERVICE DESCRIPTIONS, TECHNICAL SPECIFICATIONS AND PERFORMANCE STANDARDS  
COMCAST ETHERNET TRANSPORT SERVICES**

**Ethernet Transport Version 1.5**

Comcast's Ethernet Transport Services ("Service(s)") will be provided in accordance with the service descriptions, technical specifications and performance standards set forth below:

**Definitions**

1. **Latency.** Latency, also known as Frame Delay, is defined as the maximum delay measured for a portion of successfully delivered service frames over a 30 day period.
2. **Jitter.** Jitter, also known as Frame Delay Variation, is defined as the short-term variations measured for a portion of successfully delivered service frames over a 30 day period.
3. **Packet Loss.** Packet Loss, also known as Frame Loss, is the difference between the number of service frames transmitted at the ingress UNI and the total number of service frames received at the egress UNI over a 30 day period.

**Service Descriptions**

1. **Ethernet Network Service (ENS).** ENS enables customers to connect physically distributed locations across a Metropolitan Area Network (MAN) or Wide Area Network (WAN) as if they are on the same Local Area Network (LAN). The service provides VLAN transparency enabling customers to implement their own VLANs without any coordination with Comcast. ENS offers three Classes of Service (CoS), as described below. The service is offered with 10/100Mbps, 1Gbps or 10Gbps Ethernet User-to-Network Interfaces (UNI) and is available in increments starting at 1Mbps. The ENS Service is not available over On-Net HFC.
2. **Ethernet Private Line (EPL).** EPL service enables customers to connect their Customer Premises Equipment (CPE) using an Ethernet interface. EPL service enables customers to use any VLANs or Ethernet control protocol across the service without coordination with Comcast. EPL service provides one Ethernet Virtual Connection (EVC) between two customer locations. EPL offers three Classes of Service (CoS), as described below. EPL service is offered with 10/100Mbps, 1Gbps, or 10 Gbps Ethernet User-to-Network Interfaces (UNI) and is available in speed increments starting at 1Mbps.
3. **Ethernet Virtual Private Line (EVPL).** EVPL service provides an Ethernet Virtual Connection (EVC) between two customer locations similar to Ethernet Private Line service but supports the added flexibility to multiplex multiple services (EVCs) on a single UNI at a customer's hub or aggregation site. The service multiplexing capability is not available at sites served by the Comcast On-Net HFC. EVPL offers three Classes of Service (CoS) , as described below. CoS options enable customers to select the CoS that best meets their applications' performance requirements. The service is offered with 10/100Mbps, 1Gbps, or 10 Gbps Ethernet User-to-Network Interfaces (UNI) and is available in speed increments starting at 1Mbps.

**4. Off-Net Service Limitations.** The above categories of Service are available as Off-Net Services, with the following limitations:

- Only available with Basic CoS;
- 10Gbps Ethernet UNIs are not available with Off-Net Services;
- Service multiplexing capability is not available on Off-Net EVPL UNIs;
- When ordering 10/100Mbps Off-Net Ethernet UNIs, speed increments may only be ordered in increments of 10 Mbps, up to a maximum size of 90Mbps; when ordering 1 Gbps Off-Net Ethernet UNIs, speed increments may only be ordered in increments of 100Mbps, up to a maximum size of 900Mbps

**Ethernet Virtual Circuit (EVC) Area Types**

Comcast Ethernet Transport Services are available both within and between certain major metropolitan areas throughout the United States. Each EVC is assigned an EVC Area Type based upon the locations of respective A and Z locations.

- a. Metro. EVC enables connectivity between customer locations within a Comcast defined Metro.
- b. Regional. EVC enables connectivity between customer locations that are in different Comcast defined Metro’s, but within Comcast defined geographic Regions.
- c. Continental. EVC enables connectivity between customer locations that are in different Comcast defined geographic Regions.

**Technical Specifications and Performance Standards for Services**

**1. User-to-Network Interface.** The Services provides the bidirectional, full duplex transmission of Ethernet frames using a standard IEEE 802.3 Ethernet interface. Figure 1 provides a list of available UNI physical interfaces and their available Committed Information Rate (CIR) bandwidth increments and Committed Burst Sizes (CBS). CIR increments of less than 10 Mbps are not available in conjunction with Off-Net Services.

UNI Speed	UNI Physical Interface	CIR Increments	CBS (bytes)
10 Mbps	10BaseT	1 Mbps	25,000
100 Mbps	100BaseT	10 Mbps	250,000
1 Gbps	1000BaseT or 1000BaseSX	100 Mbps	2,500,000
10 Gbps	10GBase-SR or 10GBase-LR	1000 Mbps	25,000,000

Figure 1: Available UNI interface types and CBS values for different CIR Increments

**2. Class of Service (CoS) Options.** As set forth in Figure 2, Comcast Ethernet Transport Services are available with three different classes of service. The CoS options allow for differentiated service performance levels for different types of network traffic. CoS is used to prioritize customer mission-critical traffic from lesser priority traffic in the network. The customer must specify a CIR for each CoS to indicate how much bandwidth should be assigned to each CoS. The performance metrics associated with each CoS are set forth in Attachment A-1.1 to the Product-Specific Attachment for Ethernet Service.

EVC Area Type	On-Net Fiber	On-Net HFC	Off-Net
Metro	Basic, Priority & Premium	Basic & Priority	Basic
Regional	Basic, Priority & Premium	Basic	Basic
Continental	Basic, Priority & Premium	Basic	Basic

Figure 2: Available CoS options by Access Type and EVC Area Type

3. **CoS Identification and Marking.** If a customer only implements a single CoS solution, they are not required to mark their packets using 802.1p CoS values. All packets, tagged or untagged, will be mapped into the subscribed CoS. If a customer implements a multi-CoS solution or for EVPL ports with service multiplexing, they must mark all packets using C-tag 802.1p CoS values as specified in Figure 3 to ensure the service will provide the intended CoS performance objectives specified in Figure 2. For multi-CoS solutions, untagged packets will be treated as if they are marked with a 0. Packets with other 802.1p values are mapped to the lowest subscribed CoS. In this case, C-tag VLAN ID values are not relevant as long as they are tagged with a VLAN ID in the range 1 to 4094. For EVPL ports with service multiplexing, untagged packets will be discarded and C-tag VLAN ID values are used to map traffic to applicable EVC's.

CoS	802.1p
Premium	5
Priority	2-3
Basic	0-1

Figure 3: CoS Marking

4. **Traffic Management.** Comcast's network traffic-policing policies restrict traffic flows to the subscribed CIR for each service class. If the customer-transmitted bandwidth rate for any CoS exceeds the subscription rate (CIR) and burst size (CBS), Comcast will discard the non-conformant packets. For packets marked with a non-conformant CoS marking, the service will transmit them using the Basic service class without altering the customer's CoS markings. Traffic management policies associated with Off-Net Services will conform to the policies enforced by the third-party service provider.

5. **Maximum Frame Size.** Services delivered On-Net support a Maximum Transmission Unit (MTU) packet size of 1600 bytes to support untagged or 802.1Q tagged packet sizes. Jumbo Frame sizes can be supported on an Individual Case Basis (ICB). For Services delivered On-Net HFC, frame sizes may not exceed 1518 MTU size (1522 with a single VLAN tag). All frames that exceed specifications shall be dropped. For Off-Net Services, MTU may vary by third-party provider.

6. **Customer Traffic Transparency.** All fields within customers Ethernet frames (unicast, multicast and broadcast, except L2CP) from the first bit of payload are preserved and transparently transported over UNI to UNI, as long as they are mapped into the EVC.

7. **Ethernet Service Frame Disposition.** Different types of Ethernet frames are processed differently by the Service. Frames may pass unconditionally through the network or may be limited as in the case of broadcast, unknown unicast and multicast frames to ensure acceptable service performance. Refer to Figure 7 for Comcast's service frame disposition for each service frame type.

Service Frame Type	EPL Frame Delivery	EVPL Frame Delivery	ENS Frame Delivery
Unicast	All frames delivered unconditionally	Frames delivered conditionally	All frames delivered unconditionally
Multicast	All frames delivered unconditionally	Frames delivered conditionally	Frames delivered conditionally
Broadcast	All frames delivered	Frames delivered	Frames delivered

	unconditionally	conditionally	conditionally
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Figure 7: Service Frame Delivery Disposition

**COMCAST ENTERPRISE SERVICES  
PRODUCT-SPECIFIC ATTACHMENT  
ETHERNET TRANSPORT SERVICES**

**SCHEDULE A-2  
SERVICE LEVEL AGREEMENT**

**Ethernet Transport Version 1.5**

Comcast’s Ethernet Transport Services is backed by the following Service Level Agreement (“SLA”):

**Definitions:**

Capitalized terms not otherwise defined herein shall have the meaning ascribed to them in the Ethernet Transport Services PSA or the General Terms and Conditions.

**“Planned Service Interruption”** means any Service Interruption caused by planned work such as scheduled maintenance or planned enhancements or upgrades to the network.

**“Service Interruption”** means a complete loss of signal that renders the Service unusable.

**Service Level Agreement (SLA)**

Company’s liability for any Service Interruption (individually or collectively, “Liability”), shall be limited to the amounts set forth in the Tables below. For the purposes of calculating credit for any such Liability, the Liability period begins when the Customer reports to Company an interruption in the portion of the Service, provided that the Liability is reported by Customer during the duration of the Liability, and, a trouble ticket is opened; the Liability shall be deemed resolved upon closing of the same trouble ticket or the termination of the interruption, if sooner, less any time Company is awaiting additional information or premises testing from the Customer. In no event shall the total amount of credit issued to Customer’s account on a per-month basis exceed 50% of the total monthly recurring charge (“MRC”) associated with the impacted portion of the Service set forth in the Sales Order. Service Interruptions will not be aggregated for purposes of determining credit allowances. To qualify, Customer must request the Credit from Comcast within thirty (30) days of the interruption. Customer will not be entitled to any additional credits for Service Interruptions. Comcast shall not be liable for any Liability caused by force majeure events, Planned Service Interruptions or Customer actions, omission or equipment.

**TABLE 1: SLA for On-Net Services provided over a fiber optic network (99.99% Availability)**

<b>Length of Service Interruption:</b>	<b>Amount of Credit:</b>
Less than 4 minutes	None
At least 4 minutes but less than 4 hours	5% of Total MRC
At least 4 hours but less than 8 hours	10% of Total MRC
At least 8 hours but less than 12 hours	20% of Total MRC
At least 12 hours but less than 16 hours	30% of Total MRC
At least 16 hours but less than 24 hours	40% of Total MRC
At least 24 hours or greater	50% of Total MRC

**TABLE 2: SLA for On-Net Services provided over On-Net HFC (99.9% Availability)**

<b>Length of Service Interruption:</b>	<b>Amount of Credit:</b>
Less than 40 minutes	None
At least 40 minutes but less than 4 hours	5% of Total MRC
At least 4 hours but less than 8 hours	10% of Total MRC
At least 8 hours but less than 12 hours	20% of Total MRC
At least 12 hours but less than 16 hours	30% of Total MRC
At least 16 hours but less than 24 hours	40% of Total MRC
At least 24 hours or greater	50% of Total MRC

**TABLE 3: SLA for Off-Net Services (99.95% Availability)**

<b>Length of Service Interruption:</b>	<b>Amount of Credit:</b>
Less than 20 minutes	None
At least 20 minutes but less than 4 hours	5% of Total MRC
At least 4 hours but less than 8 hours	10% of Total MRC
At least 8 hours but less than 12 hours	20% of Total MRC
At least 12 hours but less than 16 hours	30% of Total MRC
At least 16 hours but less than 24 hours	40% of Total MRC
At least 24 hours or greater	50% of Total MRC

THE TOTAL CREDIT ALLOWANCES PER MONTH IS CAPPED AT 50% of THAT MONTH'S MRC FOR THE INTERRUPTED PORTIONS OF SERVICE. SEPARATELY OCCURRING SERVICE INTERRUPTIONS ARE NOT AGGREGATED FOR THE PURPOSES OF DETERMINING CREDIT ALLOWANCES.

**On-Net Service Monitoring, Technical Support and Maintenance**

1. **Network Monitoring.** Comcast monitors On-Net Services on a 24x7x365 basis.

2. **Technical Support.** Comcast provides a toll-free trouble reporting telephone number to the Enterprise Technical Support (ETS) center that operates on a 24x7x365 basis. Comcast provides technical support for service related inquiries. Technical support will not offer consulting or advice on issues relating to CPE or other equipment not provided by Comcast.

- a. Escalation. Reported troubles are escalated within the Comcast Business Services Network Operations Center (BNOC) to meet the response/restoration interval described below (Response and Restoration Standards). Service issues are escalated within the Comcast BNOC as follows: to a Supervisor at the end of the applicable time interval plus one (1) hour; to a Manager at the end of the applicable time interval plus two (2) hours, and to a Director at the end of the applicable time interval plus four (4) hours.
- b. Maintenance. Comcast’s standard maintenance window for On-Net Services is Sunday to Saturday from 12:00am to 6:00am local time. Scheduled maintenance for On-Net Services is performed during the maintenance window and will be coordinated between Comcast and the Customer. Comcast provides a minimum forty eight (48) hour notice for non-service impacting maintenance. Comcast provides a minimum of seven (7) days’ notice for On-Net Service impacting planned maintenance. Emergency maintenance is performed as needed without advance notice to Customer. Maintenance for Off-Net Services shall be performed in accordance with the applicable third party service provider rules. Therefore, Off-Net Service may be performed without advance notice to Customer.

3. Comcast provides certain Comcast Equipment for provisioning its services and the delivery of the UNI, which will reside on the Customer-side of the Demarcation Point. Comcast will retain ownership and management responsibility for this Comcast Equipment. This Comcast Equipment must only be used for delivering Services. Customers are required to shape their egress traffic to the Committed Information Rate (“CIR”) identified in the Sales Order. Comcast will be excused from paying SLA credits if the Service Interruption is the result of Customer’s failure to shape their traffic to the contracted CIR or utilizing Comcast Equipment for non-Comcast provided services.

**Performance Standards**

“Performance Standards” are set forth in Schedule A-1 to the Product-Specific Attachment for Ethernet Service.

**Response and Restoration Standards**

Comcast has the following response and restoration objectives:

<b>CATEGORY</b>	<b>TIME INTERVAL</b>	<b>MEASUREMENT</b>	<b>REMEDIES</b>
<i>Mean Time to Respond Telephonically to Call</i>	15 minutes	Averaged Over A Month	Escalation (see above)
<i>Mean Time to Restore On-Net Comcast Equipment</i>	4 hours	Averaged Over A Month	Escalation (see above)
<i>Mean Time to Restore Off-Net Equipment</i>	6 hours	Averaged Over A Month	Escalation (see above)
<i>Mean Time to Restore On-Net Services</i>	6 hours	Averaged Over A Month	Escalation (see above)
<i>Mean Time to Restore Off-Net Services</i>	9 hours	Averaged Over A Month	Escalation (see above)

Customer shall bear any expense incurred, e.g., dispatch/labor costs, where a Service Interruption is found to be the fault of Customer, its end users, agents, representatives or third-party suppliers.

### **Emergency Blocking**

The parties agree that if either party hereto, in its reasonable sole discretion, determines that an emergency action is necessary to protect its own network, the party may, after engaging in reasonable and good faith efforts to notify the other party of the need to block, block any transmission path over its network by the other party where transmissions do not meet material standard industry requirements. The parties further agree that none of their respective obligations to one another under the Agreement will be affected by any such blockage except that the party affected by such blockage will be relieved of all obligations to make payments for charges relating to the circuit(s) which is so blocked and that no party will have any obligation to the other party for any claim, judgment or liability resulting from such blockage.

### **Remedy Processes**

All claims and rights arising under this Service Level Agreement must be exercised by Customer in writing within thirty (30) days of the event that gave rise to the claim or right. The Customer must submit the following information to the Customer's Comcast account representative with any and all claims for credit allowances: (a) Organization name; (b) Customer account number; and (c) basis of credit allowance claim (including date and time, if applicable). Comcast will acknowledge and review all claims promptly and will inform the Customer by electronic mail or other correspondence whether a credit allowance will be issued or the claim rejected, with the reasons specified for the rejection.

### **Exceptions to Credit Allowances**

A Service Interruption shall not qualify for the remedies set forth herein if such Service Interruption is related to, associated with, or caused by: scheduled maintenance events; Customer actions or inactions; Customer-provided power or equipment; any third party not contracted through Comcast, including, without limitation, Customer's users, third-party network providers, any power, equipment or services provided by third parties; or an event of force majeure as defined in the Agreement.

### **Other Limitations**

The remedies set forth in this Service Level Agreement shall be Customer's sole and exclusive remedies for any Service Interruption, outage, unavailability, delay, or other degradation, or any Comcast failure to meet the service objectives.



**COMCAST ENTERPRISE SERVICES  
PRODUCT-SPECIFIC ATTACHMENT  
ETHERNET TRANSPORT SERVICES**

**Attachment A-1.1  
PERFORMANCE OBJECTIVES  
COMCAST ETHERNET TRANSPORT SERVICES**

**Ethernet Transport Version 1.5**

Comcast Ethernet Transport Services are available both within and between major metropolitan areas throughout the United States. The performance objectives associated with traffic flows between any two customer sites are dependent upon the locations of respective A and Z sites.

**Access Types**

- 1. On-Net Access.** If On-Net A and Z sites reside within the same Market, Performance Tier 1 objectives will apply. If the sites are in different markets, another Performance Tier will apply. Applicable Performance Tier will appear on/with respective Comcast Sales Order Form.
- 2. Off-Net Access.** In addition to On-Net Access, Comcast enables Off-Net Access to Ethernet Transport Services via multiple third party providers. The Performance Tier for Off-Net Access is based upon the location of the Off-Net site, the location of the Network to Network Interface (NNI) between Comcast and the third party provider and the performance commitment from the third party provider. Comcast will specify applicable Performance Tier on the Comcast Sales Order Form for applicable Off-Net site. Standard Off-Net Access will have an assigned home market and will include the same performance metrics associated with On-Net connectivity within the respective market and between markets. Extended Off-Net Access provides customer with network connectivity, but at a higher performance Tier. Applicable Performance Tier will appear on/with respective Comcast Sales Order Form.

**Performance Tiers**

**1. Performance Measurement**

Comcast collects continuous in-band performance measurements for its Ethernet Transport Services. All latency, Jitter and Packet Loss Performance Metrics are based upon sample one-way measurements taken during a calendar month.

**2. Performance Tier 1 (PT1) Objectives – Within Market**

Performance Metric	Class of Service (CoS)		
	Basic	Priority	Premium
Latency (Network Delay)	45ms	23ms	12ms
Jitter (Network Delay Variation)	20ms	10ms	2ms
Packet Loss	<1%	<0.01%	<0.001%

**3. Performance Tier 2 (PT2) Objectives**

Performance Metric	Class of Service (CoS)		
	Basic	Priority	Premium
Latency (Network Delay)	80ms	45ms	23ms
Jitter (Network Delay Variation)	25ms	15ms	5ms
Packet Loss	<1%	<.02%	<.01%

**4. Performance Tier 3 (PT3) Objectives**

Performance Metric	Class of Service (CoS)		
	Basic	Priority	Premium
Latency (Network Delay)	100ms	80ms	45ms
Jitter (Network Delay Variation)	30ms	20ms	10ms
Packet Loss	<1%	<.04%	<.02%

**5. Performance Tier 4 (PT4) Objectives**

Performance Metric	Class of Service (CoS)		
	Basic	Priority	Premium
Latency (Network Delay)	120ms	100ms	80ms
Jitter (Network Delay Variation)	35ms	25ms	15ms
Packet Loss	<1%	<.05%	<.04%